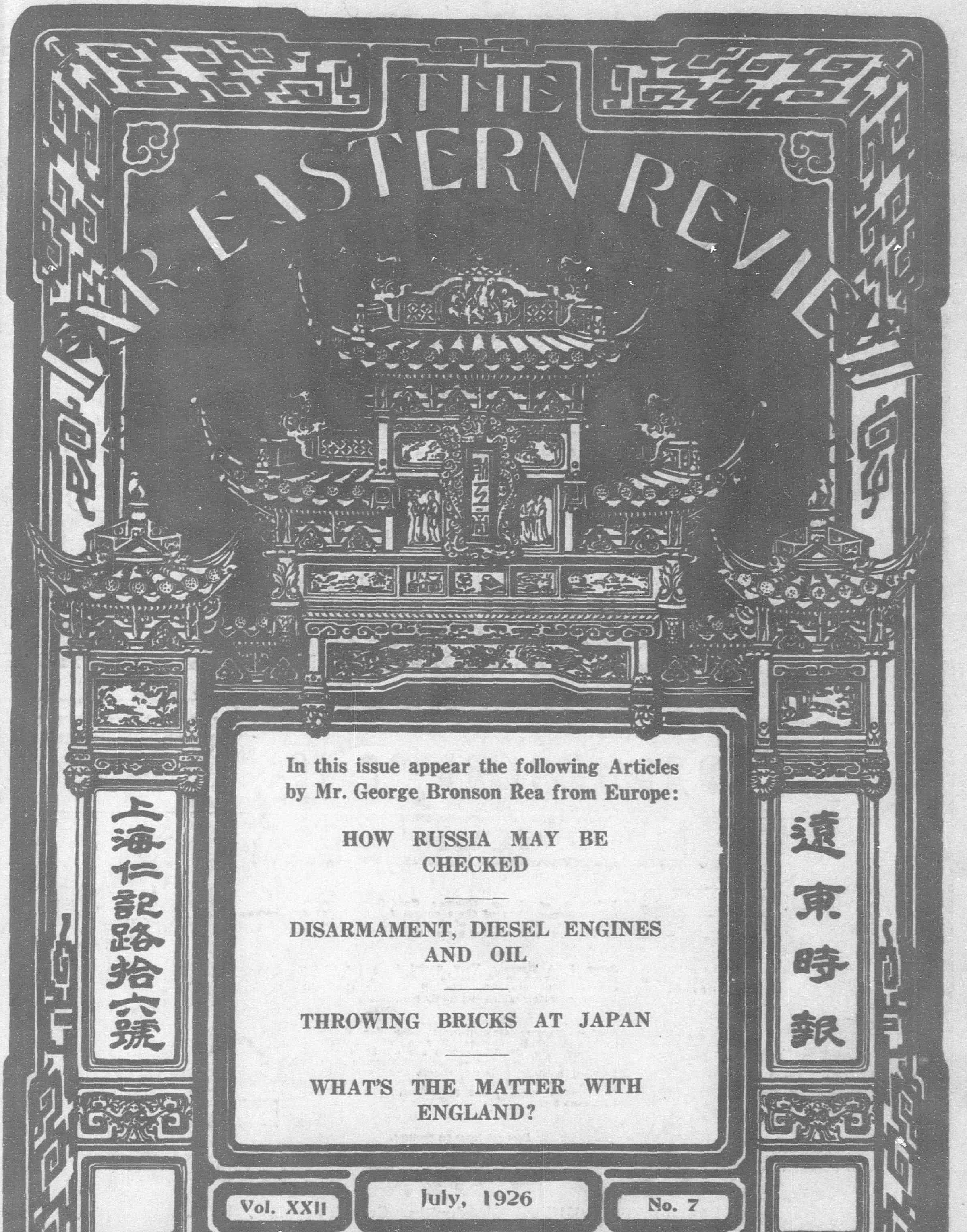

THE FAR EASTERN REVIEW

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遠東時報

In this issue appear the following Articles by Mr. George Bronson Rea from Europe:

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Vol. XXII

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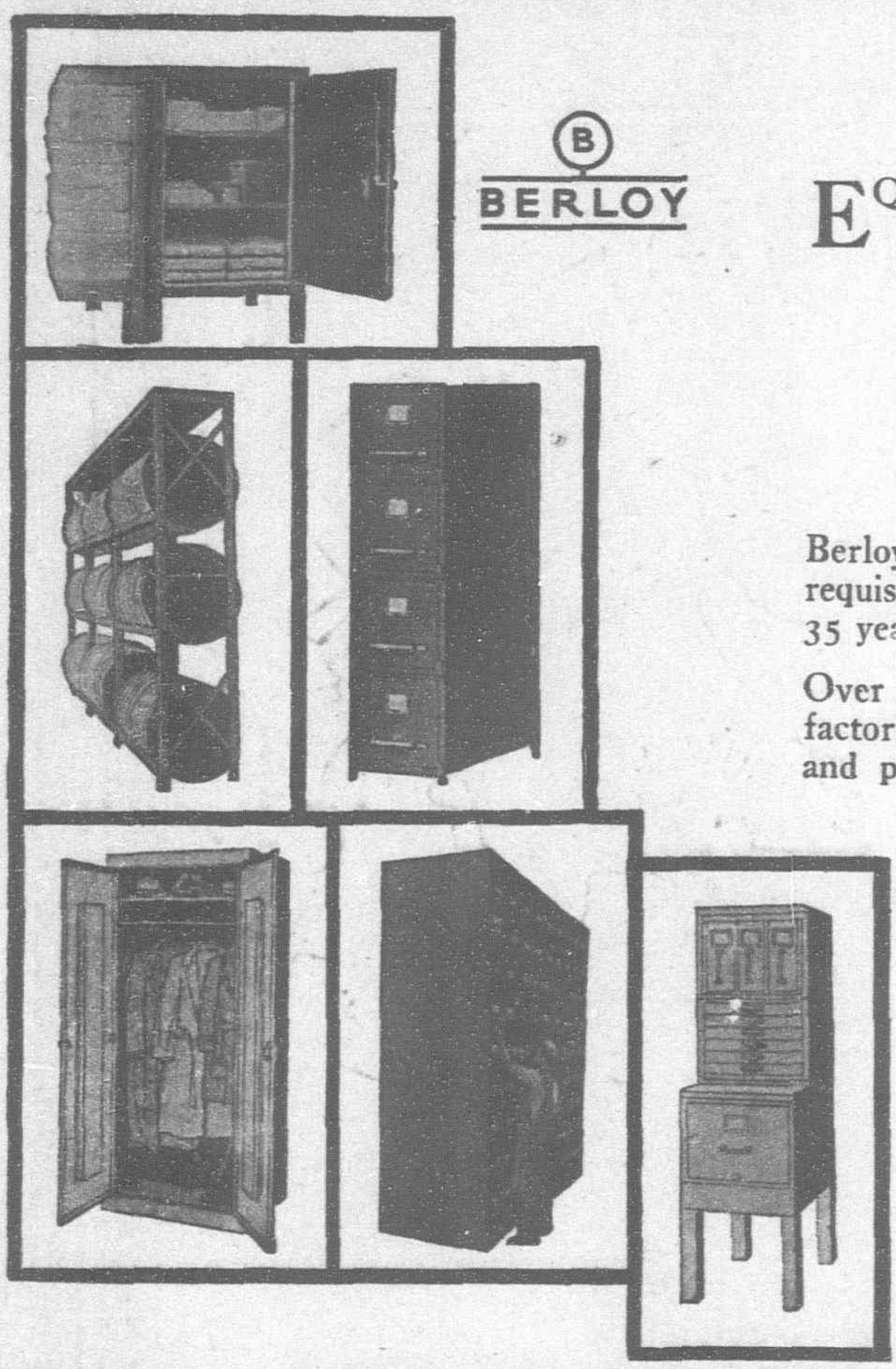

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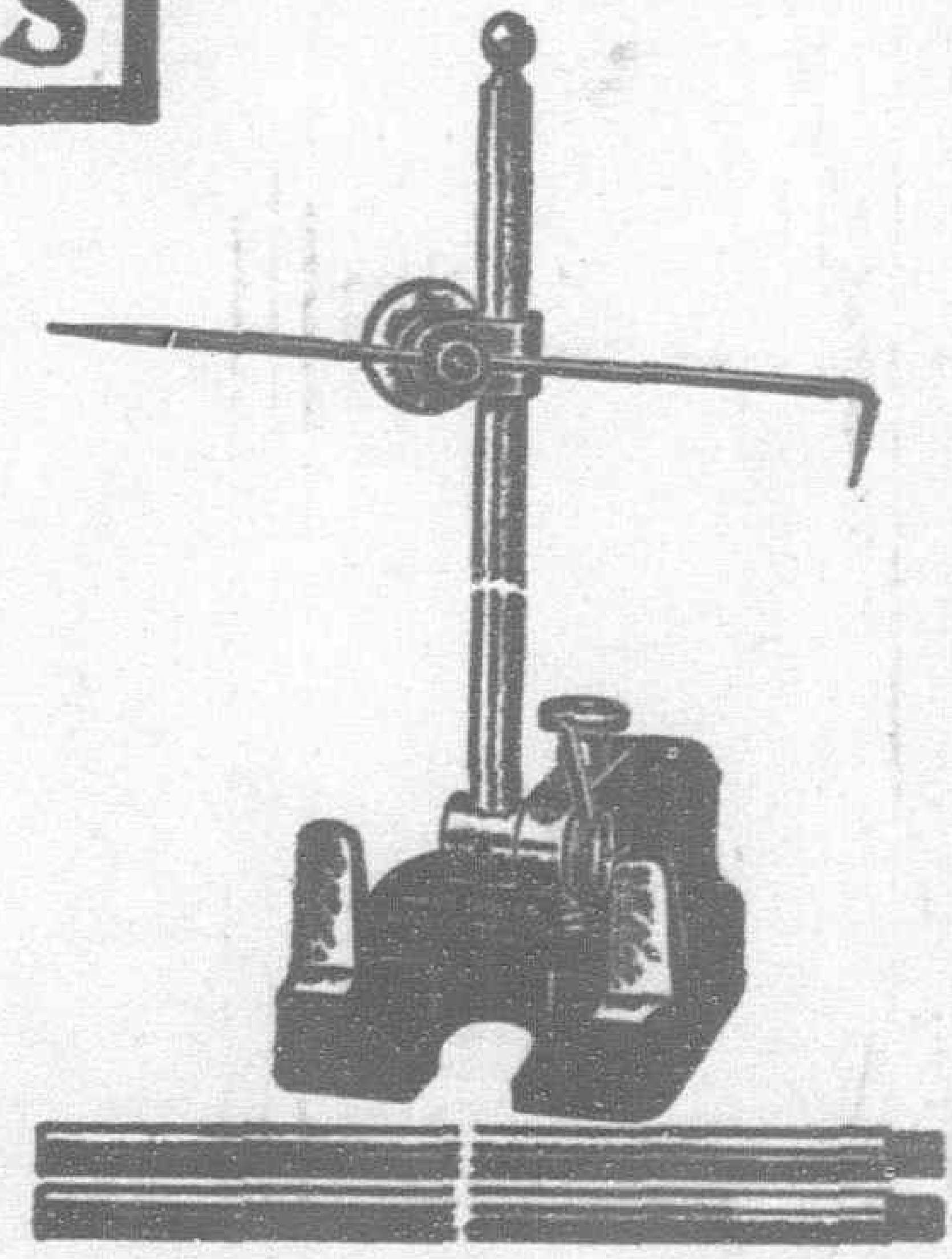

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Editor and Publisher of the "Far Eastern Review"

who is writing a series of articles on the European Angle of the Far Eastern Question.

The Far Eastern Review

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How Russia May Be Checked

The Legal Road Towards Intervention

British Support to Wu Pei-fu an Obstacle to United Action and Menace to British Prestige and Interests

By George Bronson Rea

THE seizure of the Salt Funds by the Chinese militarists is the last straw for the British holder of Chinese bonds. The security for British railway loans has long since disappeared, their trade losses in China are enormous, the position of Hongkong is desperate. Adhering scrupulously to the policy laid down at Washington the British Government will make no move for the protection of its interests in China inconsistent with the principle of Chinese sovereignty. Its hands are tied by commitments which it may break only at the sacrifice of national honor. Now the British Government may pursue tactics which at times appear torturous, it may go the limit where its vast vital imperial interests are concerned, but its most bitter opponent will be forced to admit that its influence and reputation for honorable dealing is all that is holding Europe together at the present time. Great Britain more than any other nation is under the constant search-light of intense observation. Should its government deviate one hair-breadth from the path of international rectitude it would be the signal for a general breakdown of treaty obligations and the collapse of the structure so patiently erected on the foundation of the League and the mesh of new international pacts and regional understandings which stand as the guarantees of European peace.

At no time since the Great War have conditions throughout Europe been in such a hopeless muddle. Suspicion of each other's motives and actions prevail amongst the great and little powers. Intrigue is rampant; revolution, the order of the day. Governments are overthrown over night. Dictators displace parliaments. Some nations are seeking the slightest pretext to break the faith and plunge into new adventures. It is one frightful mess and the only bright spot in the picture is Great Britain, who despite her own troubles, stands as a Rock of Gibraltar, impregnable to the assaults before which other constitutional governments have been thrown down and the destinies of nations and peoples delivered into the hands of dictators whose ambitions may perpetuate their sway and set back the clock of democracy for a hundred years. Britain's good-faith, Britain's honor, Britain's prestige and her example, stand to-day as the one hope that Europe will survive the political upheaval and reconstruct its institutions on the solid foundation of constitutional liberties. While Americans may with perfect propriety analyze, approve, condemn or criticize her manifold political activities, no greater disservice could be be done for civilization at this juncture than by destroying the faith of Europe in her honor as bound up in adherance to solemn treaties.

My thoughts drift into these channels as I read the latest news from China. On the same day we are told that the Chinese war-lords have seized the Salt Funds, the London market registered a sharp decline in the value of the 1908 and 1912 Chinese Government loans secured on these revenues. If this interference with the last security outside of the foreign controlled Customs, is made permanent, it would result in depreciating to a mere nominal value millions of pounds of gilt edged bonds now held by investors in England, Japan, France and America, the severest blow to China's credit yet suffered, when we are told that the Legations of these governments in Peking have presented a strong protest against this seizure of pledged revenues, it means that they are in earnest.

Yet, on the same day, *The Chicago Tribune* correspondent telegraphs from Shanghai that "*Marshal Wu Pei-fu's seizure with apparent British connivance* of the Salt revenues in Central China is pointed to as evidence that the British are determined to make Wu the leading power in China and thus protect their own interests." He goes on to say that "Wu is admittedly in the ascendency because of his British backing. British officials admit Wu's confiscation of the salt revenues which were pledged as security for British loans, but declare that they were unable to prevent the action."

Three days previous, on May 26, there appeared in the Paris edition of *The Chicago Tribune* an account of the investigations in Central China carried out by its representative which reveal that the guarantees of the Washington Conference respecting non-interference in the internal affairs of China is practically a dead letter and that China's political situation is back to its status preceding the world war "when the European Powers scrambled for Chinese territories."

The report goes on to state that Japan is backing Chang Tso-lin and the Fengtien army; a Russo-German combination is behind the Christian General Feng and the radical Kuominchun and Kuomintang parties and that Great Britain is supporting Wu Pei-fu and the Central party. Despite emphatic denials from British officialdom regarding financial support to Wu Pei-fu, the Germans, Russians and Japanese are equally emphatic that Wu is riding into power again as the result of British support. The British, he continues, counter by declaring that the Germans and Russians, who lost their special treaty rights as a result of the world war are now trying to reduce all the Powers to the same status by backing the Chinese radicals. Japan is interested primarily in Manchuria and is taking advantage of the situation by the European rivalries to promote Pan-Asianism, urging the Chinese to accept Japanese leadership against the white powers. The United States, although the strongest world power committed to the Open Door Policy and Chinese territorial integrity, is standing weakly on the side-lines watching the show and indifferently financing all groups through loans advanced to Japan and European powers. The situation, as he sums it up, is pregnant with future international complications which must culminate in another world war and believes that another Far East conference should be called in order to stop the present drift towards war in which he sees the break-up of the Chinese republic, a situation detrimental to future American interests in this quarter of the world."

I do not wish to underestimate the value of this summary of conditions, but it has already given rise in the European press to misgivings about Great Britain's sincerity in carrying out her commitments in China. It is this phase of the report which should be set straight, as once the idea becomes fixed that Great Britain is putting something over the others in China, it will create a precedent that will have far-reaching effects on the sanctity of other equally important treaties. It is not alone the peace of the Far East that is at stake as the outcome of such intrigues, but the peace of Europe.

Russia, undoubtedly, had subsidized the radical leaders of the Kuomintang. It seems fairly well established that Soviet money has also been paid to Marshal Feng, but if the the whole truth were known, it would probably reveal that the totals were insignificant compared to the Soviet contribution to assist the British coal miners and foment disorders in England. At any rate, whatever the Soviet may have done in China to provoke trouble, it is under no agreement with other powers to abstain from such adventures. Whatever may be the propriety of such conduct, many precedents might be quoted from history where similar outside intervention in the affairs of another country for selfish political ends has received the stamp of approval.

The only difference is that the present Russian government is the enemy of every civilized state. Instead of waging war openly and honorably to compel acceptance of its doctrines, it strikes in the dark, knifing its victims in the back, and in other dastardly ways seek to destroy those who abhor and reject its methods. If there is one legal provocation that would justify setting aside the Washington treaties one that would dispel suspicion of ulterior motives on the part of any power proposing joint action, it exits in the proof that Soviet funds are being employed to destroy their common interests in China by subsidizing a Chinese political party or army to do its work for them. When such evidence is employed as the basis of a joint diplomatic protest and the recognized Government of China is powerless to exercise its authority to put down a war against friendly nations waged by its own subjects in the pay of a common enemy, it would seem that a situation warranting a suspension of the Washington guarantees had been created. If it can be substantiated that Feng Yu-hsiang at Kalgan or the Kuomintang leaders at Canton are financed from Moscow for the avowed purpose of destroying British or Japanese investments in China and there exists no government at Peking competent to discharge its treaty obligations, then it would seem that such activities are outside the category of China's exclusive internal affairs and approximate very closely a violation of China's neutrality by a foreign army waging war on Great Britain and Japan under cover of a purely Chinese domestic quarrel.

The army of Feng is the army of Moscow, the declared enemy of the "capitalistic powers," Great Britain, Japan and the United States. Under protection of the Chinese flag the Soviet is waging a war to destroy American, British and Japanese interests, one that it would never dare to engage in under its own colors. If this is a correct interpretation of the situation, it follows that China's territorial neutrality is being violated by Russia in her war against these three powers, using the armies of a Chinese ally to do her dirty work.

Lest we forget. Li Hung-chang sold his country into an alliance with Russia in 1896 in return for a bribe of five million taels, handing over immense territories and strategical railway concessions that would serve the Russian armies as a base of operations and rapid transportation in the war of revenge that was planned to crush Japan. This sordid deal, the dirtiest, most contemptible and cowardly that disgraces the pages of modern history was maintained in such profound secrecy by both signatories that even John Hay in ignorance of its existence, became the unconscious tool of Russia by proclaiming an open door doctrine which guaranteed the territorial integrity of China to an extent that Japan was bound hand and foot by an honorable acceptance of its provisions while the two conspirators working in the dark were whetting their knives to butcher the bound victim. That one American mistake was paid for by Japan in the sacrifice of over 200,000 men in fighting the bloodiest war of history to that date.

Is history to repeat itself ? America knew nothing of what was transpiring behind the scenes in 1899 ; are we any better informed in 1926 ? We went to Paris is 1919 in sublime ignorance of secret treaties which made our diplomatic success at the Peace Conference impossible. What do we know of the real nature of the secret agreements existing between Moscow and Feng ? Can we trust the word of either ? After all, what do we care ? Feng is the super-Christian, the idol of the missionaries, the star convert who brings the dollars rolling into the fund which keeps alive America's chief industry in China. No matter what happens, America is safe. We have nothing to lose. We have no investments, no industries, nothing at stake that represents the toil of our pioneers in building up the prosperity of that country. We are reaping profits from increased trade at the expense of those whose hands have been tied by our idealistic policies. We will emerge from the wreck and ruin of other foreign interests in China with enhanced commercial and political prestige, arrogating to ourselves the credit of having staved off intervention and encroachments on her territorial integrity. America will once more pose as the saviour of China. The sufferers will be those nations who accepted our program at Washington and have since looked to us for a leadership we have not the courage to assume. In the same may that our open Door diplomacy in 1899, protected Russia in her preparations for war against Japan, so again in 1926 our sentimental concern for China at the Washington Conference has encouraged, facilitated and protected Russia's further preparations for war against Japan and Great Britain and the eventual absorption of China into the Soviet system. What the final outcome of it all is to be, God only knows.

It is stupid for Americans to believe that either Japan or Great Britain are violating their Washington pledges by financing any particular Chinese war-lord for the purpose of acquiring a dominant influence in the affairs of that country. The Chinese leader who can stay but for more than a few months, does not exist. The evidence advanced to date in support of the statement that Moscow is financing the anti-foreign elements in China seems to be fairly well substantiated but when the same charge is brought against Japan or Great Britain it becones a matter of grave concern to the other treaty powers.

Now, it is not so long ago that Baron Shidehara, Japan's Foreign Minister, made a public statement and communicated it through the Japanese embassy at Washington to the State Department, categorically denying the report that Japan was assisting Chang Tso-lin. He stated emphatically that Japan was pursuing a clean-cut, straightforward policy of hands-off China, leaving her to adjust her internal affairs in her own way without interference or pressure. When Baron Shidehara made that statement, he meant exactly what he said. No more honorable statesman ever directed the foreign relations of any government than this high-minded, true-hearted representative of modern Japan. What he says can be depended upon.

Viscount Terauchi squandered several hundred millions of good Japanese yen in bolstering up Tuan Chi-jui during the great war, in the same manner and for the same reasons which induced America and Great Britain to finance their European allies. Instigated by Anglo-American propaganda against Japan, subsequent Chinese governments attempted to repudiate these loans and to date have paid neither interest or any part of the principal. Aside altogether from her commitments with other powers, Japan has learned the bitter lesson that it does not pay to lend money to China for political purposes. At this time of intense financial stringency when economy is the constant watchword in Japan, the cabinet minister who would sanction the diversion of public funds for adventures in China would be retired in disgrace and would drag the government down with him. Japan has no funds of her own to throw away for such purposes and to suggest that the proceeds from loans raised in America for urgent reconstruction and industrial uses are being devoted to political adventures in China, is utter rot. Yet the average Chinese and his fanatical American dupe, firmly believe that Japan is diverting these loans to support Chang Tso-lin's campaigns against Wu Pei-fu. When pressed for some tangible proof, they immediately hedge and state that the Japanese Government itself is maintained in ignorance of the details of the transactions, which, they declare, are carried out by some secret agent of the Japanese General Staff, using funds earmarked for military purposes and for which no account is rendered to the Diet. It is a very ingenious reply. Undoubtedly, the Japanese General Staff has a liberal secret fund at its disposal for legitimate military observation, but that it is supplied with unlimited millions at a time when retrenchment and rigid economy in every department has become the supreme concern of the nation is a reflection on the patriotism and intelligence of the cabinet. The present government would not last twenty four hours if these allegations could be proven.

The idea that state subsidized secret societies exist in Japan to promote the doctrine of Pan-Asianism has also taken a strong hold amongst Americans. The Black Dragon Society, promoted some years ago with this object in view, did succeed in raising the sum of Yen 40,000 from one enthusiastic but obscure capitalist who died shortly afterwards. When his contribution was finally exhausted in the publication of a monthly propaganda magazine, the activities of the society suddenly ceased. Whatever campaign may now be carried on in China to promote Pan-Asianism under Japanese leadership, has no more official connection than the similar Japanese hallucination that Americans are secretly conspiring to bring China under their tutelage through the spread of our missionary, educational and uplift institutions. At least, one campaign is quite as legitimate as the other.

What is true of Japan is equally true of great Britain. They are both in the same boat. The British have also learned to their sorrow that lending money to bolster up any particular war-lord in China, does not pay. They sponsored and carried through the Reorganization Loan in 1913 in order to supply Yuan Shih-kai with the funds to reorganize the government and consolidate his position as dictator. After kicking out the parliament, hounding its members into exile, destroying the republic and stirring up civil war, Yuan lost out in the end and with his death went British dreams of perpetuating their influence. The only returns the British have received on this investment has been the enmity of Sun Yat-sen and the parliamentary party. They are still drawing dividends of hate for their disastrous mistake in venturing into and taking sides in Chinese politics.

That British opinion throughout China supports Wu Pei-fu is undeniable. British official opinion may also lean towards this militarist as the best leader to restore a strong central government in that country, but no British government would openly align itself with his fortunes by providing him with official funds, even if such a procedure were possible . Wu would waste the money in the same manner that Yuan and Tuan did in fruitless operations against Canton, while the mere suspicion that he was being financially supported by Great Britain would result in prolonged boycotts and further misfortunes for Hongkong and British trade generally.

So long as Wu Pei-fu adheres to his determination to unify China by the sword and rejects peace by compromise, no responsible British official or private financial group would dare to invite the certain penalty that Canton would inflict for their interference in Chinese affairs. The same argument which applies to Japan applies with equal force to Great Britain. The British Government has no funds to throw away on Chinese adventures. It is staggering under a crushing burden of debt and taxation, operating under a deficit in its budget and rapidly eating into the reserves of the nation ; it is maintaining nearly two million unemployed ; its trade is falling off ; grave labor troubles confront it at home ; unrest prevails in India and Egypt and a spirit of independence throughout the Dominions is sapping the foundations of the Empire . Every power in Europe is trying to put something over the British Government, yet on top of all these troubles, it is supposed to be wasting its funds backing a Chinese war-lord whose success can be attained only at the expense of further disaster to British interests throughout China. The British, like the American government has no funds at its command for such adventures. The expenditure of every penny is being closely scrutinized by parliament and the opposition would hail with joy any slight irregularity that could be used to bring about the downfall of the cabinet caught with the goods. It is safe to state that British support to Wu-Pei-fu is not official. Perhaps then, it is some British bank. Which one ? The Hongkong & Shanghai Banking Corporation ? This institution has taken many chances in the past in lending money to China but only when requested to do so by its government or with its approval. That approval could not be obtained at this time without violating the consortium and Washington agreements. The financial strength of the Hongkong & Shanghai Bank is enormous but not so invulnerable that it could stand the strain of financing Wu Pei-fu whose right hand general would probably betray him during the first battle. The strength of the Hongkong Bank lies in its intimate knowledge of China. It has never been known to hand out good hard cash without substantial collateral and guarantees that the loan will be repaid with interest. There are too many Scotsmen connected with the management of that bank to let politics or sentiment overcome their business judgement. Go through the list of other British banks in China and it will be found that there are none that could afford to jeopardize their depositors' money and financial standing by taking a chance on Wu Pei-fu. What British commercial firm could stand the strain ? Most of them are already facing bankruptcy or being carried by the banks, so when we eliminate these what other British interests remain which might have the funds to support Wu ? None.

The truth about alleged British support to Wu Pei-fu is based solely on the fact that he was picked out by a group of enthusiastic journalists in Peking at the height of the anti-Japanese hysteria some years ago, as the only Chinese leader who they believed would play into their hands. From the time he first appeared in a leading role on the military stage, they formed themselves into an admiring cleque, praising, boosting and grooming him for the job vacated by Yuan Shih-kai. Public opinion was sedulously prepared to accept him as the Saviour of China, and as a consequence, the British (and American) commercial community, hearing his praises sung daily by his press agents and his prowess dinned into their ears, extended to him their sympathies and moral support. That is all there is to British support to Wu Pei-fu, a purely artificial and manufactured sentiment created and kept alive by interested Peking journalists, whose propaganda, accepted by the Southern leaders as reflecting British official policy is very largely responsible for the trade reprisals which have brought disaster to Hongkong and ruin to many British firms in North China.

The foreign trading community in China is paying the penalty for the anti-Japanese campaign launched during the world war for the purpose of eliminating Japanese influence from Peking. Wu Pei-fu is the Little Tin God of the anti-Japanese cabal, the super-Patriot and Emancipator who is to drive the Japanese from Peking and Manchuria and run the Chinese Republic with loans advanced by America under the guidance of a British adviser. The fulsome adulation and extravagant praise of his military prowess, his executive ability, his Washingtonian integrity and other qualifications for leadership (all of which he may possess to a high degree) indulged in by the foreign newspapers in China have created the impression that this press championship must be backed by substantial support from the British government or its financial instruments. The British themselves are to blame for fortifying this impression, by proposing a loan to Wu's government through the consortium as soon as Chang Tso-lin was defeated and his alleged pro-Japanese cabinet ousted two years ago. Only the veto of Japan prevented this deal from going through.

Not only the Japanese, the Russians and the Cantonese, but Americans as well, have become convinced that British influence is behind Wu Pei-fu. Whatever initiative to stabilize conditions in China might have been taken at one time by the American Government was made impossible by the certainty that British propaganda and intrigue would move heaven and earth to consoldidate Wu Pei-fu's dictatorship over the Chinese republic under British advisers with loans raised for the most part in the American market.

Nearly every responsible American in China was upholding Anglo-American coöperation as the one salvation of the country and the few American newspapers which might have voiced an independent opinion were playing into the hands of the British by endorsing Wu Pei-fu as their candidate for dictatorial honors. These Americans, who for a long time thought they were shaping the policy of Washington, overreached themselves in laying down the law to the State Department. As one highly placed American official said to me the other day in Paris while discussing the Chinese situation ; " why should we take the initiative to restore stability in China when it would inevitably lead to our putting up the money to retain in power some military autocrat under obligations to the British or Japanese, and whose policies would be influenced by advisers of either of these powers. We would simply be holding the bag for the other fellow." " Washington," he said, " was not blind to the real significance of Anglo-American coöperation. As we see it, American interests will derive no lasting benefits from the appointment of additional foreign advisers to the Peking government. Anglo-American coöperation as preached in China and dinned into the ears of Washington works out to the sole advantage of Great Britain and it is not supported by any body of public opinion either in England or the United States."

He was right and although THE FAR EASTERN REVIEW has vigorously protested against the subordination of our trade interests in China to philanthrophy, it has nothing but praise for the wise diplomacy which has kept America from being made the cats-paw for other national interests, be they Chinese, British, French, Japanese or Patagonian.

The present is no time for the British to take sides with any faction in China. It is a dangerous game and no matter which side wins, even if their favorite Wu comes out on top, he will still have to reckon with Canton, who will retaliate on Hongkong. Moral support and sympathy is one thing, but when the British are openly charged with backing their favorite, it places their government in a most difficult position at a time when British honor and fidelity to treaties are the twin beacon lights of the haven shining across the stormy wastes of political waters on which are fixed the eyes of the tempest-tossed peoples of Europe exhausted by the wars and batterings of the past decade.

A word of friendly advice. Drop the talk about Anglo-American coöperation. It leads nowhere. The American Government will never take the initiative to fasten upon the Chinese people the puppet of any other Power, nor will it permit its financiers to participate in any loan transaction that accomplishes the same ends. If the American Government has adhered to a policy of strict non-intervention in the affairs of China and insists that others do the same, the reasons are obvious. Anglo-American propaganda led by the foreign press in China is directly responsible for the sentimental mistakes of the Washington Conference. America is not being railroaded into any more mistakes through similar methods.

If the American Government is to deviate from this policy and initiate or participate in any plan proposed by other Powers, such action must be based on irrefutable evidence that will justify the suspension of treaties which bind its signatories to inaction while a vindictive enemy is taking advantage of the absence of constituted authority in China to violate the neutrality of its territory in waging a destructive war against their interests.

This is the one legal road to intervention.

Disarmament, Diesel Engines and Oil

By George Bronson Rea

London, May 26.

TEN years ago there was barely a quarter of a million tons of motor shipping on the seas. By July of last year, world tonnage had increased to 2,714,073 and the latest figures give a total of 1,200,000 tons under construction against 1,078,236 tons of steamers! The figures are more striking still when it is known that during the past year new construction (outside of the United Kingdom) has exceeded steam as high as 150 per cent, while in the United Kingdom, the stronghold of steam engineering, the proportion is roughly fifty per cent. The average size of steamers now being built is approximately 3,500 tons gross, whereas that of motor vessels is about 7,800 tons gross, showing the tendency to employ oil engines for the larger types of craft. The total tonnage being built in Denmark, Holland, Italy, Japan and Sweden amounts to 453,000 tons gross against steamers of only 133,000 tons. What the tonnage will be in the next five years at this rate of unprecedented increase is difficult to forecast. It will be many years, if ever, before motor ship tonnage exceeds that of steam, but at the present rate of progress it is not difficult to look ahead to the time when the steamship will be relegated to an inferior position, confined to short distance traffic along routes enjoying abundant and cheap coal supplies. For long distance cruises and tramp trading the motor ship will displace the steamship because of its increasing economy in running costs. In fact, the annual reports of the Bank line and the East Asiatic Company, two of the largest shipping companies in the world, show that their Dieseled engined fleet enabled them to make a profit for the term.

Aside altogether from the saving in operating costs, calculated at 50 to 60 per cent of coal burning and about 30 per cent of oil-fired steaners convincing figurvs are now advanced to prove that the motor ship will be a deciding factor in conserving the fast dwindling oil-fuel supplies of the world. This argument is set forth in the figures given in the last report of the American Petroleum Institute which state that in 1925 between 11 and 12 million tons of fuel oil were delivered for ship's bunkers, a very large proportion being for the use of oil-fired boilers, whereas all the motor ships afloat (approximating 3,000,000 tons) do not consume more than 1,500,000 tons annually. If the fuel now supplied for all marine purposes was utilized wholly in motor vessels it would suffice for a fleet of about 25,000,000 tons gross, or about 45 per cent of the world's total steam tonnage. This fact is bound to have a tremendous bearing on the future of steamship construction and may, in the interests of conserving oil supplies, be forced upon the attention of governments and naval designers.

It is within the realms of possibility that the present oil-fired war ships and fast passenger liners may have to modify their propulsion machinery in order to conserve the world supply of oil for other more essential, and productive uses and return to coal or adopt the more economical Diesel engine. The immense stocks of oil now hoarded and wasted for the maintenance of the world's war fleets in the face of rapidly diminishing supplies, will be required for other more productive work. The rapid development of the Diesel engine will bring this vital conservation problem measurably nearer a solution and provide an additional argument in favor of scrapping useless battleships when the questions of disarmament and future fuel supplies occupy the attention of the governments concerned. If our oil supplies are limited and urgently required for future industrial and productive purposes there would seem to be good reasons for some international agreement that would abolish the use of oil-fuel now wasted on the world's navies in favor of a more economical method of propulsion. If it is inconceivable that America and Great Britain will ever fight each other and that war in the Pacific between Japan and America is equally foolish, the maintenance of great fighting fleets using up at an enormous rate the priceless fuel required for our industrial and economic needs is a crime against civilization and human progress.

The issue may be shirked or side-tracked for another few years but we make bold to prophecy that the pressure of public opinion demanding oil conservation will compel the calling of an international conference to devise regulations to confine this essential fuel to the more important uses of our civilization. Data gathered by the American Institute of Mining and Metallurgical Engineers indicate that the peak in the use of fuel oil is about reached and that a reduction in the use of this fuel should be expected in the future. Changing back to coal as a fuel by many industries is foreseen owing to the reduced supply of fuel oil on account of the future great demand for petrol and lubricating oils. In industries now using oil as fuel the success and low cost of pulverized coal will undoubtedly influence a change in this direction. The further waste of oil as fuel for steam warships and commercial liners should be prohibited in the interests of the general welfare. The time must arrive when the only navies that will be able to count on an adequate supply of oil as fuel will be those of America and Great Britain. Nations lacking oil resources of their own will be hopelessly disqualified in seapower and in order to maintain their fleets in a condition of preparedness will be forced to store immense quantities of fuel oil against the possibility of war, automatically withdrawing these vital supplies from industrial uses.

The tendency of the times is to draw more and more on the Russian oil to make up the decreasing output of other producing countries. The Soviet is dangling the bait of rich concessions before the capitalists of the world in exchange for their influence in obtaining recognition. The French and Italian navies are now largely dependent on Soviet oil which also finds an expanding market in Turkey, Germany and England. At the present rate of consumption in America and England, together with the improvident use of this fuel in navies and commercial steamships, it will not be long before the Soviet will hold the naval powers of the world in a vassalage that can only be compared to the British hold on the crude rubber supply. Disarmanent through a forced change in propulsion power may have to be faced and if we must have battleships and insist on using oil for propelling them, the Diesel engine will become the only safe insurance against an oil famine and ruin to may industrites.

Why then waste time holding useless disarmament conferences when America and Great Britain control the major part of existing oil deposits, assuring to their fleets a preponderating advantage over all others in the event of war ? How can we honestly expect France, Italy or Japan to sacrifice their power of defense by a still further impairment of the only effective weapon against such a menace ? Although these less favored nations might not be able to store a sufficient quantity of fuel oil to carry their battleship and cruiser squadrons through a prolonged war, they could readily provide against such an emergency as far as their submarines are concerned. It is not difficult to understand the French reluctance to accept further restriction in submarine construction when viewed from this standpoint, and although Japan, because of her impregnable geographical position, might be willing to accept a further limitation of lesser naval armaments, she would also probably reject any new scheme which would deprive her of her one remaining defense against the fast cruisers of the two nations enjoying a monopoly of oil fuel.

Disarmament to be practical and acceptable to all nations should be based on something more than mere quotas, an arrangement that within ten years will automatically eliminate from the picture all but the two greatest naval powers who control in their own territories the world's oil supplies or who are able with their superior fleets to bottle up the oil exports from Russian Black Sea ports. An international conference convoked at the instigation of the threatened automobile, aircraft and other industrial consumers of petrol, supported by an overwhelming public opinion in all countries for the prohibition of oil as fuel for steam driven battleships, cruisers and commercial vessels, and limiting its use to the more economical merchant motor ships would compel a return to coal as the fighting fuel of the future. Such a plan would place all the naval powers on a more equitable footing as regards fuel, conserve the oil resources of the world for productive uses and create a more favorable sentiment for the further reduction of heavy armaments. The issue is one as to whether the world is to be deprived of motor vehicle and air transport in order to perpetuate the criminal waste of oil as fuel for unproductive purposes.

From the modest beginnings of a few years ago when the first small motor driven vessel poked her nose out timidly into the competition with steam, each year has witnessed astounding advances, until to-day there are several great passenger motor liners of about 20,000 tons with six more under construction. Italy is building a 33,000 ton motor liner for the South American trade and there is now talk of ordering one equal in tonnage to the *Majestic* for the trans-Atlantic passenger traffic.

It is only a step from this to battleships and here because of its greater cruising range the motor ship offers certain definite advantages. There is now no doubt that motor engines can be built to develop any power that can be attained with the steam turbine. The 33,000 ton Italian motor liner is to develop 31,000 horse-power for a speed of 21 knots. It is authoritatively stated that there would be no difficulty in constructing a quadruple screw motor ship developing 60,000 horse-power and here we come within measurable distance of the great battleships and largest trans-Atlantic liners.

This challenge to steam and supremacy of British shipbuilding is occupying the minds of the ablest engineers in the United Kingdom. Every effort is being made to perfect the steam turbine in order that this menace to national prestige and prosperity can be successfully overcome. In a former article we made brief mention of the new turbine steamer launched on the Clyde embodying the latest land developments in high pressure and superheated steam practice, which it is confidently hoped will meet the challenge of oil and preserve the supremacy of the British engineering and shipbuilding industry.

The Diesel inventors got the start of the British engineers during and immediately after the war, perfecting their patents at a time when the British were too occupied in turning out emergency steam vessels to devote their attention to innovations. As a consequence, the most successful Diesel engines have so far been designed and built by European engineers, Swiss, Danes, Germans and Dutch. The merchant fleets of Holland, Germany, Denmark, Sweden, Norway and Italy all contain a larger proportion of motor ships than Great Britain and unless a heroic effort is made by the British engineer to develop the turbine to a point where it is once more the most efficient ship propelling power, foreign ship owners will place their orders for new vessels in those conutries which have taken the lead in motor ship construction.

British engineering skill may rise to the occasion and develop the turbine to a point where it can succeessfully compete with its oil-driven rival, but the latter has a long start in its favor and is also being steadily improved and perfected, so that whatever gains may be made by the turbine will undoubtedly be offset by greater efficiency and more economical operation of the Diesel engine. The best opinion is to the effect that the internal combustion engine will completely supercede steam on all the important world trade routes and there exists in some quarters the conviction that it may also prove the best type for short-distance runs.

It is not surprising to find that Japan in order to hold its place as a great sea power is also building motor ships to compete for world carrying trade. Although late in entering the race she has the advantage of being able to select the most approved and efficient types of motors developed under actual practice. In October of last year, out of a total merchant tonnage 3,919,807, Japan has only 66,236 tons of motor ships. On December 31, there were 33,350 tons under construction in her yards and for the quarter ending March 31, the figures are given as seven motor ships totalling 30,310 tons against :15,380 tons of steam construction.

These figures indicate that despite the surplus tonnage in Japan and depressed state of the shipping industry the demand for the more economical motor ship is compelling shipowners to face the hard facts of a situation that has driven their European competitors to scrap even uneconomical motor vessels in order to build larger, faster and more economical units. The older vessels of Japan's mercantile marine engaged in long-distance trading will have to go or be relegated to secondary services in order to make way for ships that can earn a profit on a lower margin of expense in competition with up-to-date rivals. The next few years will undoubtedly witness a revival of shipbuilding in that country, and although the engines may be purchased in Europe or America, the hulls and auxiliary machinery will be built in the home yards. For the next few years, Japan will become an important market for the best types of Diesel engines.

Throwing Bricks at Japan

A Dangerous Pastime

By George Bronson Rea

London, June 1st, 1926.

THE other day I stopped at a book store to purchase a copy of "*The Daily Mail Trade Union Mission to the United States*" and while I stood looking over other new publications a Japanese gentleman entered and ordered twenty five copies of the same book. We had met several times in Tokyo and the recognition was mutual. After the usual greetings I asked him what he was going to do with twenty five copies of *The Daily Mail Mission* : " it must interest you very much," I ventured.

" Well " he said " I will not be secretive. I am making a through study of British trade and industrial conditions and this little book seems to have got down to the heart of things in such a condensed and comprehenseive manner that I am sending copies to some of our big financiers and manufacturers at home." " You know," he continued, "that Japanese trade in India and China is increasing to such on extent in certain lines that the British have raised the cry of 'unfair competition.' We feel that if our success continues, the same propaganda that was levelled against Germany before the war will be turned against us. We have learned a lot about these things and realize that unless we are prepared to answer these attacks in a dignified and convincing way, world opinion will again turn against us and we will have a harder job to restore confidence in our nation than the one that faced us after the Paris Peace Conference."

"We are working hard to increase our exports to China and other Asiatic countries as the only means by which we can exist and we are certain that as our trade expands at the expense of Great Britain's, a powerful press campaign will be directed against us. Now, we are not all saints in Japan. There are amongst us many small inexperienced traders in foreign business, but they are being fast weeded out. Our leading manufacturers, bankers and commercial houses, who are carrying the load of Japan's export trade, are as honorable as the best in America or England, and we are at a loss to explain at times why we are so persistently maligned and wrongly accused of engaging in unfair competition. We are able in many instances to fairly underbid our British competitors and knowing our own methods and manufacturing conditions, we have come to the conclusion that the real causes of their inability to compete must be sought for in some other direction."

"Our Cotton Spinner's Association and leading Chambers of Commerce have been compelled to take notice of the campaign directed against Japan because we have not signed the international eight-hour-day agreement. The Indian mill-owners and their British spokesmen, as well as Lancashire, use this fact as the basis of an agitation to prohibit the importation of our goods into India and create an unfavorable sentiment towards our traders in all parts of the world. As a matter of fact, there is absolutely no difference between the working hours in Japan and India. They both work on an ten-hour day basis, but the Japanese pay their operators as much as thirty per cent. higher wages. Our superiority over the Indian and some of the British mills consists entirely upon our highly organized purchasing, transportation and sales methods, in conjunction with a spirit of cooperation and pulling harmoniously together for the higher interests of the country. Because of this we are able to pay better wages and still undersell our competitors. Although we are still far behind the Americans in manufacturing efficiency, we have adopted and improved upon many of their ideas which has enabled us to successfully compete with the more loosely conducted methods of British traders. That is all there is to it, and if the British in the Far East will read the report of the *Daily Mail Trades Union Mission to the United States*, they will understand just how in adopting American ideas, we have been able to hold our own and pay higher wages than they do in India."

"It is a grave mistake to think that Japan has entered into a trade war with any nation. We do not employ sweated labor and the living conditions of our workmen, while not comparable perhaps to the best Western ideas of housing, conform to Japanese stands of comfort and after seeing for myself the slums of England and the depressing surroundings in some of the factory and mining districts, I am satisfied that our Japanese manufacturers have a much higher regard for the welfare of their workers than the British mill owners."

"Lancashire," he continued, "insists that British goods cannot compete with our products because our cotton industry is protected by the State and carried by subsidized shipping. Well even if true; what of it? Japan buys over half the Indian cotton crop as well as large quantities of iron ore, jute, leather, cereals and other raw materials, manufactures the raw cotton into finished textiles at higher wages than are paid in the India mills and sells them in the Indian market at a profit. Our steamship companies receive a small mall subsidy from the government, which in its total for all world services does not exceed Y.7,000,000, nothing at all compared with the amounts disbursed by the British treasury for similar purposes, without taking into consideration the grants-in-aid for the construction of British naval reserve liners, which constitute a subsidy far more important than any Japan has ever or could ever extend to its shipping lines. The time is past when any nation can question the right of another for protecting its own industrial life by any legitimate means within its power and within its treaty rights. The word "subsidy" covers many things which are now expressed by words which are spelled differently but mean the same thing. Japan may find ways and means to protect and stimulate its export trade, but whatever she does along these lines, seems to be an invitation for our British competitors to accuse us of questionable tactics."

"*Of course, there is nothing wrong when the British* government subsidizes its coal industry to the extent of £23,000,000 in one year and the end is not yet in sight. What the total out-of-pocket loss to the British tax-payer and his export trade will be, is difficult to estimate, but with the losses incidental to the general strike calculated at £50,000,000, added to the direct coal subsidy, it is almost as much as the Japanese budget for reconstruction purposes and much more than we pay for all our imported cotton on which we eke out an existence. Let us admit," continued my Japanese friend, "that coal is the basic British industry and that a direct subsidy of £23,000,000 was imperative to save it from ruin. The export of coal has in the past given to Great Britain her maritime and industrial supremacy and still cuts a large figure *in her national economy. It is her inability to compete in foreign* coal markets with other producers since the war that is the real cause of her constant trade decline. The decrease in Britain's output of coal over the pre-war period of twenty five million tons is equivalent to her loss of coal exports, which at an average valuation of twenty shillings per ton, represents an annual loss of £20,000,000 in the coal export trade alone. The loss of this market and carrying trade has been reflected in the decline of her her mercantile marine and other industries. The situation was therefore desperate and the government came to the rescue and extended state aid in order to tide over labor troubles pending a proper reorganization of the industry. This was eminently proper. It was Great Britain's own affair."

"In the same way, Japan's industrial life, its economical welfare, in fact, the very existence of its people, depends to a very large extent upon its most important industry and its ability to purchase on equal terms raw cotton in India, America, Egypt and other producing centers, transport it to Japan in its own bottoms and there manufacture it into finished products and export them to nearby countries in competition with other manufacturing nations. Our only asset is our adaptability to changing economic conditions, efficiency in purchasing, transporting and manufacturing, and to do this successfully in the face of the keenest competition we have perfected an organization, world-wide in its scope and activities. Now, if our government should extend facilities to this basic national industry in order that its crowded millions can have food to eat, our British competitors would immediately raise the cry of "unfair competition" and endeavor to have laws enacted that would shut us out of their markets. Principles which seem right and proper applied to England when its own vital interests are at stake are wrong and improper when extended to other peoples faced with the same intense problems. The next time the British complain about Japanese subsidies or facilities to its textile industry, they should remember the old saying about people who live in glass houses."

"The results of my investigations convince me that Britain's troubles arising out of the decline in her textile trade are due entirely to causes at home. The capital invested has been highly watered and many of the mills are now being carried by the banks. Instead of cutting down costs they have tried to carry on by asking high prices at the same time reducing the hours of work and the pay-roll. The industry is highly individualistic, without cohesion or cooperation to the extent that the spinners are now asking for government control in order to create discipline and abolish throat-cutting sales competition between the mills. The textile industry in England is suffering from such a complexity of ailments that it would be hard to state which one of them is the worst. However, we Japanese are better acquainted with these questions than we were ten years ago and when we are again attacked and accused of practicing unfair competition, we are prepared to quote their own authorities in proof of their own lack of efficiency, cooperation and discipline, which in many other lines of industry as well, prohibits them for the present from competing in world markets with other better equipped nations who are obliged through dire necessity to work harder and longer in order that they may feed themselves and survive."

"You cannot pick up a newspaper or magazine that does not contain some article or reference to the present deplorable industrial and trade conditions in England and even with the best will and tardy getting together, it will take them a long time to climb back to their former international trade position. In addition, I have collected a score or more of books written by competent authorities which go into the subject in detail and now that we know the truth, we do not intend to remain silent under another campaign that stirs up hatreds and boycotts against us in Asia and makes our hard lot harder to bear. My reports,," he continued "will be placed before the financiers, manufacturers and traders of Japan so that they will understand exactly what they have to contend with."

It would serve no good purpose to reveal the name of my Japanese friend. He is well known. He evidently knows what he is talking about and his words brought home to me that Japan has learned a lot in the past seven years about publicity. The Japanese are on the job. He spoke the truth about conditions in Great Britain and his words are sufficient to indicate that it will be extremely difficult and dangerous at this juncture for the British to start another press campaign for the purpose of discrediting Japanese commercial methods in Asia. British bricks thrown at Japan are no longer arguments. They are boomerangs.

What's the Matter with England?

A Study in Democracy

By George Bronson Rea

WHAT'S the matter with England? This question in many forms is the burden of editorial articles and books by the score, all seeking to diagnose the trouble and prescribe a remedy. Britain's real problem is industrial; how to preserve her commercial supremacy and export her manufactured products in sufficient quantities to maintain a favorable balance of trade and pay for the food to keep her people alive. There are many complexities to this phase of her troubles, but the closer they are diagnosed the clearer it becomes that all her ailments are deep rooted in the cancer of labor unrest developed through decades of unprecedented prosperity and high-living with no thought given to improving the conditions of the working classes, the life blood of the nation.

"*We want fewer titled people on the board and more plain John Browns and Tom Smiths*," declared a disgruntled shareholder at the annual meeting of one of Britain's great industrial concerns which last year met with adverse conditions. After reading the voluminous reports on industrial conditions in Great Britain and the testimony of the many experts seeking to define the causes underlying the present unrest, the basic truth which hits an American square in the eye is forcibly expressed in the above trite remark.

Labor saving and aiding machinery, increased outputs, mass production, organized salesmanship, high grade advertising, and all the other advantages which enable American workmen to earn high wages and live in comfort, and even luxury, are only incidental to the greater and more highly prized incentive which holds out the certain promise of reaching the top of the ladder if they make good. There exists no class barrier or prejudice against the man in overalls in a country where every child born may legitimately aspire to become its president.

"*Americans have never believed in the theory that executive ability is invariably inherited*," remark the two brilliant British investigators who wrote the able commentary on American prosperity and factory methods, entitled "The Secret of High Wages." A few months after the appearance of this book, when the members of *The Daily Mail* Trade Union Mission to the United States had concluded its tour and seen the inside working of our mills and factories and listened to the testimony of superintendents, foremen and men, as well as of many British mechanics who owned their own homes and drove their own automobiles, the members of the mission sat down to a farewell dinner and round-table conference in New York with over thirty of the great captains of American industry. Every man who sat at the table with the British workmen on a plane of absolute equality started life either in overalls or in an office position at the bottom rung of the ladder.

Co-operation, fellowship, equality, are the real secrets of American prosperity, the true spirit of a democracy that opens the door of equal opportunity to the highest positions in every walk of life to the man who contributes to efficiency. Inherited wealth, family names, social prestige, political connections or any of the qualifications deemed so essential for high position in Europe carry no weight with American corporations, whose first duty and concern is to make profits for the shareholders. Opposed to this principle stands the European conception of democracy centering around a crowned head and titled aristocracy with its finely drawn lines of class distinction which relegates the working man to the bottom of the social scale and condemns him to perpetual ostracism and servitude.

The lesson of America has struck deep into the hearts of British workmen and employers, separated by a wall of misunderstanding, distrust and controversy, defying all efforts to bring about a real union of interests. Initiative, efficiency, enterprise, and other exceptional qualities which elevate a British mechanic above the dead level of his shop companions is severely repressed by jealous superiors and penalized by his co-workers. Is it any wonder that many of the best British engineers and mechanics have emigrated to the United States, where by diligence and merit they have found promotion and prospered to the point of owning their own homes and are still able to send to the old folks out of their savings an amount in many cases equal to the former wage paid them in Great Britain?

There is hope for a nation which can turn out the best mechanics in the world, admitted as such even by their American competitors, but that hope can be realized only when the doors to promotion are thrown wide open to those whose qualifications fit them for the highest executive positions. And when these men who have come up from the bottom have revolutionized industrial methods, restored Britain's commercial supremacy and saved the nation from going under in the struggle for existence, they should be honored to a higher degree than if they had added a new colony to the Empire or gained a trick in the game of diplomacy. These are the men who should be given a handle to their names, tapped on the shoulder with a sword and knighted, alphabets thrown at them and elevated to the peerage, so that when they retire from active direction over the nation's key industries they may sit in the House of Lords and watch over the vital interests of the British people.

When the John Browns and Tom Smiths can aspire to the highest honors in the British Empire and look forward with some degree of certainty to reaping the full rewards of merit in a democracy of which they form the backbone, Britain will come into her own and no other race or Power will ever wrest from her the supremacy. These same John Browns and Tom Smiths of England, Ireland, Scotland and Wales have made America. They constitute our aristocracy, our best society, the brains of a true democracy that has elevated the United States to its present pinnacle of power and prosperity.

Does the Boycott Work?

Chinese Maritime Customs Report for 1925 Shows Increased Trade Returns

Hongkong Not Wiped Out

IT has often been suggested that the economic boycott might be a substitute for wars, particularly when the small or backward nations have grievances against the powerful nations. The Chinese people have often resorted to the boycott as a method of voicing their opposition to an official, or to the imposition of an objectionable tax. Similarly, the Chinese have, on occasion, articulated their objections to the political policies of a particular foreign power, by attempting to enforce a boycott against that nation's goods in China. Thus, in 1919-20, an anti-Japanese boycott was attempted. Although that boycott was supposed to be nation-wide and complete, although it was often suggested by Chinese that Japanese industry had suffered so severely, that there was no recovery, the Customs returns indicated altogether a different result. They showed that there was a decrease in trade, but it was comparatively small, and from it there was soon a recovery. The following were the figures :

	Hk. Taels
1918	402,252,670
1919	441,947,029
1920	371,063,768
1921	382,469,965
1922	391,183,236
1923	409,541,643

The year 1925 has been regarded by business men as one of the worst that China has known. From May 30 until September the whole country seethed with anti-foreign, particularly anti-British, agitation. Hongkong was boycotted. British goods were supposed to be boycotted. Yet the Customs returns for the year indicate an increase for the whole country. On this subject, the Statistical Secretary of the Chinese Maritime Customs remarks as follows :

> " But, from the point of view of revenue collection, the year under review cannot be said to have been unsatisfactory. It is true that the increase on the 1924 collection was only some Hk. Tls. 275,000, but even so small an increase, in the face of all the obstacles to trade which arose during the year, is very encouraging and augurs well for the future. It shows that trade may have been hampered, but was not discouraged ; that at every possible opportunity it gathered a fresh impulse ; that if an outlet to the sea was closed to a certain produce it succeeded in finding its way out by some means or other ; and that even if up-country dealers in foreign goods followed a hand-to-mouth policy, still they kept themselves supplied with goods and never allowed stocks to run out altogether. The Shanghai incidents of the 30th May, with their counterblast in the South, bade fair to paralyse trade ; but the strike and boycott movements were soon restricted to certain centres only, and what could not be shipped or imported through Shanghai or Canton found its way in many cases through neighboring ports or through other large seaports, such as Tientsin. Exception being made for the southern and, principally, the West River ports, the Shanghai incidents were but a temporary setback to trade in general."

The net value of Foreign Trade for the year, as compared with 1924, showed a slight decrease : 1924, Hk. Taels 1,789,995,145 ; 1925, Hk. Taels 1,724,217,881. According to the statements of the Canton Government, Hongkong was altogether without trade and on its knees ; yet the figures show that whereas the trade with Hongkong in 1924 was Hk. Taels 417,082,283, it amounted to Hk. Taels 291,026,056 in 1925, when the boycott of the island was supposed to be 100 per cent. complete. Similarly, British shipping, which was boycotted in South China during the year since May 30, and in all parts of China for from three to five months, showed the following results :

1924	55,715,925 tons
1925	42,942,484 ,,

On the other hand, the city of Canton showed a decrease which is so enormous that the figures speak simply for themselves :

	Hk. Taels
1924	136,795,718
1925	46,142,534

The story of silk most clearly shows how merchants having goods to sell will find a way, no matter what impediments are placed in their paths. The Statistical Secretary gives the following :

> " The average monthly importation of raw silk into America for the past five years is given as follows :—

	Bales		Bales
1921.. ..	27,695	1924.. ..	32,306
1922.. ..	32,574	1925.. ..	40,500
1923.. ..	29,184		

> "The Shanghai market was not affected to any great extent by the May 30 incidents, and a brisk trade has been carried on throughout the year. Canton, on the other hand, has been hampered seriously by the boycott and by labor troubles, with result that towards the month of September the Canton silk market had to be transferred to Shanghai, where trade could be effected under almost normal conditions. The silk trade became active immediately after the Chinese New Year holidays. While Shanghai steam filatures and tussore filatures found a very good market in New York, Lyons showed an interest in Shantung and Szechuen yellow silks, so that the old season closed, early in May, with almost depleted stocks. The new season opened under favourable conditions, with good crops and satisfactory prices. The market was steady and without fluctuations in prices until August, when a rise of Tls. 50 to Tls. 100 per bale was registered. The fall of the franc towards the end of the year seriously affected the Lyons market, and though the price of yellow silk from Shantung and Szechuen declined about Tls. 50 per bale, the two months of November and December were very unfavourable to low-grade silks, especially to Canton silk. Better conditions prevailed for Shanghai steam filatures, thanks to the active demand from America and to speculative buying in the open market. The new tussore crop was good, and the market opened in November with prices ranging from Tls. 435 to Tls. 470 per bale, to steady down around Tls. 450 at the end of December. Domestic consumption also has been very good, so that a fair amount of Shanghai steam filatures, which formerly was exported abroad, has been absorbed by local mills."

In another place, he states the following :—

> " The Canton silk trade will be considered in a later section of this report, but it should be stated here that, in spite of the fact that during the September quarter many firms were forced to transfer their business to Shanghai, it compares favorably with the results obtained in the preceding year. One must remember, however, that 1924 was not considered a prosperous year for silk."

Now, the fact which becomes most obvious in any discussion of the boycott on the basis of Customs returns is that a regional boycott is bound to fail, because the Chinese merchant will find a method of bringing goods into his market or sending his raw products abroad. This was true in the anti-Japanese boycott of 1919 ; it was true in the anti-British boycott of 1925. It is utterly impossible to shut off the supply, once the demand has been created. The boycott, then, resolves itself into an internal political struggle between the articulate boycotters and the shrewd merchant. It naturally affects foreign imports to an extent, but it does not do anything like the damage expected of it.

China's Hard Luck

THE Tariff Conference was intended to be the beginning of the end of China's political inferiority. The Powers were ready to meet China more than half way. When Dr. C. T. Wang introduced a radical program of readjustment, the Powers conferred with his delegation in a manner which is regarded here as even more than conciliatory. The Japanese delegation did everything possible to make the Conference a success and even worked on a proposal for a reciprocity tariff, so that China might benefit by the position of her exports in the world markets. It looked very much as though success were entirely with China—so such so that some of the foreigners whose interests are dependent on the *status quo* were expressing a definite irritation at the complete success of the Chinese delegation.

Thereupon one of those wholly useless and senseless civil wars took place. The government in power was driven from office, and for a period there was no government at all, a self-constituted committee looking after the welfare of the city of Peking. Subsequently, a makeshift government came into existence, more to satisfy the necessity for a continuity of diplomatic relations than to exercise any power in the land.

The Tariff Conference, meanwhile, could not meet because there were no Chinese delegates with whom the foreigners could discuss matters. All the Chinese delegates but two ran away, while some of the foreigners returned to their own countries to await a further call for the Conference. The heads of the Japanese and American delegations sat about Peking hopelessly waiting for China to realize what was happening. The one chance in half a century was thrown before the militarists like pearls before swine.

The same conditions obtained with the Commission to investigate extraterritoriality. They could not make satisfactory investigations because in some provinces they were not wanted at all, while other places could not be reached because of the Civil War. When a group of the Commissioners did travel about the country their investigations were necessarily perfunctory and unimportant. Whatsoever report the Commission makes will carry little weight at this time in redetermining the status of the foreigner in China under the treaty.

On the other hand, foreign opinion in China and at Home is growing weary of the continuous attacks on foreign life and property in interior places without redress by law or executive order. Even when a coolie in Chengtu chopped off the head of a kindly missionary lady he was so lightly punished that head-chopping may become an unpunishable offense in the land . Almost in any country would a similar offense have brought upon the offender either capital punishment or life sentence. In Chengtu, he got a little over a year. In South China missionary property is constantly being seized on the assumption that the Powers will do nothing to protect their nationals in China. Business firms find that they cannot collect debts or have absconding compradores punished. One foreign firm, for example, agreed to arbitrate a claim and asked the Chinese to name the arbitrator. The Chinese named an American consular official, who, on the basis of facts, decided in favor of the foreign firm—whereupon, the Chinese, who had named the arbitrator, refused to abide by the decision.

The cumulative effect of all the anti-foreign data is doing China no good. Men who were a year ago strongly pro-Chinese now find themselves doubters. Even many missionaries, who sacrificed the business man in their effort to win Chinese good-will, are becoming dubious of the value if this good-will. China is steadily losing in the favor of the world—yet the Chinese themselves risk all this, to satisfy the promptings of an inferiority complex which says: "China can do no wrong."

This leads one to Mr. Chu Chao-hsin's speeches before the League of Nations. As Mr. George Bronson Rea, in a recent article, pointed out, Mr. Chu is a brave, capable, fighting diplomat, who is striving to win equality for his nation. But Mr. Chu is beset by China's hard luck. The Government in China does nothing to back up Mr. Chu. The provincial officials commit outrages every day which give the lie to Mr. Chu's assurances. Mr. Chu does the best he can, but who can fight China's jinx ?

How the Attempt to Suppress the Press was Defeated in Strike

From our London Correspondent

THE story of "The British Gazette," the daily newspaper brought out by the British Government during the recent great general strike in Great Britain, constitutes a real journalistic romance. The production of this paper, its foundation in a day and a night, and the multiplication of its issue within a week to the stupendous total of over 2,000,000 is one of the most signal exploits and adventures in the annals of English journalism. Nothing like it has ever been done before anywhere.

The exceptional occasion provided the inspiration and the opportunity, but it also imposed the severest opportunities. What was done constituted a triumph of resource and determination over what might well have been insuperable difficulties. It is a triumph which served equally well two notable causes—it defeated the attempt to keep Britain in the dark during the crisis, and it vindicated the press against a new conspiracy to muzzle its freedom.

The masterpiece of the general strike, which commenced on May 3 at midnight, was to be the shutting down of the newspapers.

What was to be done ?

The Government felt it impossible to acquiesce in the prospect of the country exposed to the almost total cessation of its industry, and at the same time deprived of its news—the one medium through which public opinion might express itself.

The Government therefore decided to act, and Chancellor of the Exchequer Churchill called to the Treasury on the morning of the day of the strike the representatives of the Newspaper Proprietors' Association (representing the London press). He obtained, however, very little encouragement from the conference. Its members were unable to co-operate in the production of a common emergency news sheet.

At this juncture the editor of the "Morning Post," the chief supporter of the Government in the London press, wrote to the Deputy Civil Commissioner for London, stating that, with the Government's help, he would undertake to produce a four-page bulletin paper, to the number of 100,000 daily, and suggesting that if there were any difficulty the Government should commandeer some big newspaper office and order so many papers to be published.

The publication of what proved to be the last number of the "Morning Post" for an indefinite period proceeded meanwhile. An emergency edition was sent out at 9 p.m., and, as the mechanical shift did not strike until the completion of the regular shift, it was possible to produce at midnight a 20-page edition. Its distribution, however, was limited by the cessation of the train services.

On the eve of the strike the editor, managing editor, and general manager drafted a formal memorandum for presentation to the

Cabinet, outlining a definite scheme of co-operation with the Government. It offered, if adequate protection were given, to begin by printing 100,000 copies of a news sheet nightly, and to raise the output to 400,000 copies by the end of the week. It placed the Post's staff at the Government's service, to work under its direction and authority.

Late that night the Chancellor of the Exchequer, the Air Minister, and the Deputy Civil Commissioner, together with a train of departmental officials, visited the editor. They came to act on the suggestion of his letter—to commandeer the "Morning Post" on behalf of the Government, and to convert it into a Government bulletin, "The British Gazette." Sir Malcolm Fraser was installed as the direct representative of the Government.

The step about to be taken was a momentous one both for the Government, which had never hitherto taken responsibility for the production of a daily newspaper, and the "Morning Post," which in over 150 years had only once intermitted its daily issue. The Government action meant that its resources were to be handed over to others and that its very name was to disappear. Only the extreme gravity of the occasion could have justified the innovation on the one side and the self-effacement on the other.

The act of taking over having been duly confirmed, an editorial conference, with the paper's technical staff present to advise, was continued until 3 a.m. Everything now depended on the men employed on the mechanical side. At 4 a.m., with the strike four hours' old, the general manager summoned a meeting of the machine room overseers and put the case to them. All but the foundry overseer agreed to carry on.

The compositors were then summoned and addressed by the editor and the general manager. They responded to the appeal to stand by the paper, but insisted on reporting to their union. Pending instructions they started the setting of the first number of "The British Gazette," and had got up to five columns of matter when, at 5 a.m., their representative returned to say that they were forbidden to touch the work. It then seemed doubtful if anything more could be done, for the production of a paper with no one to set the type is impossible.

The Chancellor of the Exchequer then 'phoned to Lord Beaverbrook, proprietor of the "Daily Express," who responded by lending the one man without whom it is not too much to say the situation could not have been saved. This was the night superintendent of the "Daily Express," Sydney W. H. Long. Only five columns of the 14 in the first number were set. Mr. Long set the rest with his own hands.

With Mr. Long came the head machine-room overseer and the chief mechanical engineer of the "Daily Express." A little later the "Daily Mail" provided its chief stereotyper for the foundry. In the machine-room there was left of the "Morning Post" staff only the works manager and the overseer, but they were later reinforced by the chief engineer, the chief electrician, and the linotype mechanic. Three or four men, however, even if they all are experts, cannot run two rotary presses. There was some volunteer labor, all of it inexpert, but it was thought better to depend on members of the editorial staff of the "Morning Post." Leader writers, art and music critics, reporters, sub-editors, financial experts—every able-bodied man, of whatever rank or station, was recruited for the occasion, and all responded.

The machines were late in starting. There was an accident in the foundry; a mould was broken, and it took nearly two hours to clear away the splashed metal so that the autoplate would work again.

When the last plate had been locked on the cylinder and the signal to start was given, it was nearly midnight. By six a.m. 230,000 copies of the first "British Gazette" had been produced, and largely distributed. The first supplies were sent to the airplane stations to be conveyed to the provinces, and the remainder of the edition was dispatched by truck and car for London circulation. On Wednesday morning the "British Gazette" was a newspaper in being.

It was the first step that cost. Every succeeding night the organization improved, the resources developed, and the processes of production became more methodical and easily working.

On the first night it had been necessary to leave the two inside pages of the four-page sheet a blank. On the next night, Wednesday, however, all four were filled with news, and the issue was doubled in number. The total print increased rapidly in geometrical progression, until, at the end of a week, no fewer than two million copies were being printed and distributed.

To produce this result a complete reorganization of the office had to be undertaken. Sir Malcolm Fraser directed the paper editorially for the Government, and W. R. Codling undertook control on behalf of the State Stationery Office, which has charge of all Government publications. W. H. Smith & Son, the news agents, undertook the distribution. Admiral Sir Reginal Hall, Parliament member, took charge of the personnel, and paper and ink supplies were committed to two other important personages.

A new telephone system was rapidly installed and arrangements were made for feeding the multitudinous staff and sleeping many of them on the premises. The protection of the building was undertaken by police and special constables and admission could only be obtained by special pass. It was like a beleaguered fortress.

Work on production began at 10 a.m.—only a couple of hours after the printing of the previous issue had ceased. This early start was essential owing to the fact that there was only one man operating the linotype.

Many of the key-men worked, sleeping in snatches, for 72 hours on end, and a number never left the building at all. Now that the strike is over the elaborate and painfully adjusted machinery has had to be scrapped. But the great task attempted has been achieved. The attempt to cripple the freedom of the press was effectually frustrated.

"The British Gazette" may have had a short life; but it fulfilled the purpose of living.

The Recovery of the Japanese Yen

By Elgin E. Groseclose

THE recovery of the Japanese yen from a low level of $0.3794, reached in October, 1924, has been particularly rapid during recent months. From $0.4166 on November 2 and $0.4312 on January 2, the yen rose to $0.4743 on April 28; and it has maintained the 47-cent level since that time. This recovery can be attributed to a number of factors, chief of which are (1) the return to normal in the balance between Japanese imports and exports, (2) the utilization of the bullion reserves of the country, (3) the tranfser of foreign balances to Japan as a result of the high level of interest rates there, and (4) speculative activity at home and abroad.

Less Unfavorable Trade Balance

Japan normally has an unfavorable trade balance—before the war from 50,000,000 to 100,000,000 yen. Following the earthquake and fire of September, 1923, imports took a tremendous jump due to shipments of lumber, construction material, and other supplies needed to restore losses sustained through that catastrophe, and the unfavorable merchandise balance climbed to 646,657,000 yen for 1924. During 1924, however, the Government made strenuous efforts to restrict imports and to rebuild the country's foreign trade. A policy of strict economy was adopted by Government departments, and, whenever possible government supplies were purchased at home rather than abroad. This step reduced the 1925 import of this item by 20,000,000 to 30,000,000 yen. Export guilds and foreign-trade syndicates were fostered by the passage of the export guild law; and, through the semi-official Yokohama Specie Bank, more liberal financial assistance was extended to exporters.

While imports continued greater in 1925 than in 1924, the drop in the yen gave an added advantage to exports; prosperous conditions in the United States assisted in the expansion of the silk trade ; the rise in the pound sterling made it possible to compete with British piece goods in various quarters of the world ; and in India a depreciated yen was the final lever which boosted Japanese piece-goods exports to that country in competition with the Indian native mills. The year 1925 closed with a merchandise balance of only 267,068,056 yen against Japan.

Invisible Trade an Important Factor

This unfavorable balance is offset by various invisible payments on account of shipping services, interest on Japanese foreign investments abroad, remittances of Japanese emigrants, and other items. The Japanese Government has recently commenced to survey these invisible payments, and the study recently released estimates that invisible trade for the year 1924 amounted to 407,000,000 yen in favor of Japan, which came within 239,000,000 of balancing the merchandise account. The recovery in trade during 1925 has tended more nearly to equalize the flow of funds in and out of the country, and this has been an important factor in the rise of the yen.

Decline in Specie Holdings

Japanese specie holdings at the end of last year stood at 1,413,000,000 yen, a drop of 76,000,000 from the figure for January 31, 1925. A still further decline was registered for the first quarter of the present year, holdings on March 31 totaling 1,373,000,000 yen. The figure for the end of 1925 was 765,000,000 yen smaller than that for the end of 1920, which represented the highest record in the past. During the five years from 1920 to 1925, the Bank of Japan's specie reserve decreased from 1,246,688,000 yen to 1,056,998,000, a drop of nearly 190,000,000—principally accounted for by the action taken September 20, 1922, excluding from this reserve gold held abroad.

The country's specie holdings during the past 12 years have been as follows :

Specie holdings of Japan

End of—	Total *Thousand Yen*	Bank of Japan's Specie *Thousand Yen*	End of—	Reserve Total *Thousand Yen*	Bank of Japan's Specie Reserve *Thousand Yen*
1914... ...	341,000	218,237	1921... ...	2,080,000	1,245,574
1915... ...	516,000	248,417	1922... ...	1,830,000	1,063,886
1916... ...	714,000	410,519	1923... ...	1,652,000	1,057,471
1917... ...	1,105,000	649,618	1924* ...	1,489,000	1,059,024
1918... ...	1,588,000	712,925	1925... ...	1,413,000	1,056,998
1919... ...	2,045,000	951,976	1925† ...	1,373,000	1,070,000
1920... ...	2,178,000	1,246,688			

Reductions in Specie Holdings of Government

Since 1922 the holdings of the Bank of Japan, it is evident, have remained nearly stationary, and the reduction has occurred in the specie holdings of the Government.

The following table shows the specie holdings at home, abroad, by the Government, and by the Bank of Japan :

Distribution of Japanese holdings of specie

Year End of :	Government *Thousand Yen*	Bank of Japan *Thousand Yen*	At home *Thousand Yen*	Abroad *Thousand Yen*
1914...	49,000	292,000	128,000	213,000
1915...	153,000	363,000	‡132,000	‡379,000
1916...	262,000	452,000	227,000	487,000
1917...	386,000	719,000	461,000	644,000
1918...	855,000	733,000	453,000	1,155,000
1919...	1,051,000	994,000	702,000	1,343,000
1920...	887,000	1,291,000	1,116,000	1,062,000
1921...	791,000	1,289,000	1,225,000	855,000
1922...	667,000	1,163,000	1,215,000	615,000
1923...	525,000	1,127,000	1,208,000	444,000
1924...	—	—	—	—
1925 : January	441,000	1,078,000	1,175,000	314,000
December	343,000	1,070,000	1,155,000	258,000
1926 : March 31	303,000	1,070,000	1,143,000	230,000

The specie holdings of the Government dropped 68,000,000 yen during 1925, and have declined another 40,000,000 yen since January 1 of the present year—chiefly in foreign holdings.

In September of last year, the Government announced its intention to meet its own payments abroad by shipping specie rather than by purchasing exchange, and shortly thereafter it began shipments of bullion. By the end of the year approximately 22,000,000 yen were thus released. The yen rate, partly as a result of this, partly because of the heavy export balance during the second half of 1925, rose rapidly unitl it reached $0.45 early in February, when the Government ceased its gold shipments. The yen remained stationary at around this figure until April. On March 10 the Government announced that the shipment of specie would be resumed in May, and since then the yen has again climbed upward until it is now above $0.47. Just how much more of the Government's specie holdings at home safely can be devoted to supporting the yen is not known. The Japanese *Jiji Shimpo* estimates that there are available about 60,000,000 yen which can be devoted to this purpose if necessary.

Decline of Interest Rates

One of the interesting elements in the Japanese exchange situation has been the transference of foreign balances to Japan—due to higher interest rates prevailing there, coupled with the security of the funds deposited and with the speculative possibility of a rise in yen exchange. The year 1925, however, witnessed a steady decline in interest rates in Japan. This was reflected in the reduction on April 15, 1925, of the discount rate of the Bank of Japan from 2.2 sen per day (8.03 per cent.) to 2 sen per day (7.3 per cent.), and in the declining yields in the six principal classes of securities. The combined average yield of these six classes was 7.151 per cent. on January 4, 1926, as compared with 7.897 per cent. on January 6, 1925. The yield continued to drop still further until on April 1 the average was 7.047. The yields of the average groups of securities at various intervals since January, 1925, as compiled by the Hypothec Bank of Japan, are shown in the following table :

Average Yield of Japanese Securities

Issues	1925 Jan. 6 *Per ct.*	1925 Apr. 1 *Per ct.*	1925 July 1 *Per ct.*	1925 Oct. 1 *Per ct.*	1926 Jan. 4 *Per ct.*	1926 Apr. 1 *Per ct.*
8 national bond	6.144	6.112	5.969	6.007	5.908	5.851
8 municipal bond	7.609	7.446	7.233	7.061	6.896	6.817
6 Hypothec Bank	7.892	7.456	7.100	7.116	7.158	7.057
6 agricultural and industrial bond ...	8.796	8.763	8.209	7.887	7.752	7.599
6 industrial and colonial bank ...	8.227	7.813	7.573	7.469	7.373	7.308
8 company debenture	8.713	8.383	8.000	7.945	7.818	7.651
Average	7.897	7.662	7.347	7.248	7.151	7.047

The decline in interest rates has been due principally to restricted Japanese industrial activity, the emphasis which the Government has laid on further retrenchment in business, and the Government's insistence on smaller dividends generally. As a result of Government injunction, most of the banks of Japan reduced their dividends in 1925. Notwithstanding the decline in interest rates, the yield was still sufficiently attractive to draw foreign funds into Japan for deposit.

Japanese exporters have viewed with some apprehension the continued appreciation of the yen. This fear seems unfounded, however, since the trend of trade is much more favorable to Japan this year than last. The first half of the year is usually a period of heavy imports, since the silk movement commences later in the summer and fall. The unfavorable balance for the first four months has been only 293,500,000 yen, according to preliminary figures announced by the Government, against 461,900,000 during the corresponding period in 1925.

With the yen only a little more than 2 cents from par, the question has arisen as to whether the Government would remove the embargo on gold exports when the yen touched par. This embargo has been operative since 1914.

Recent Speculative Activity

More recently, Japanese exchange is reported to have been bought heavily by Chinese, in expectation that it would shortly go to par or in the belief that there is no immediate future for silver. The latter motive is analogous to that which produced the flight of capital in Europe.

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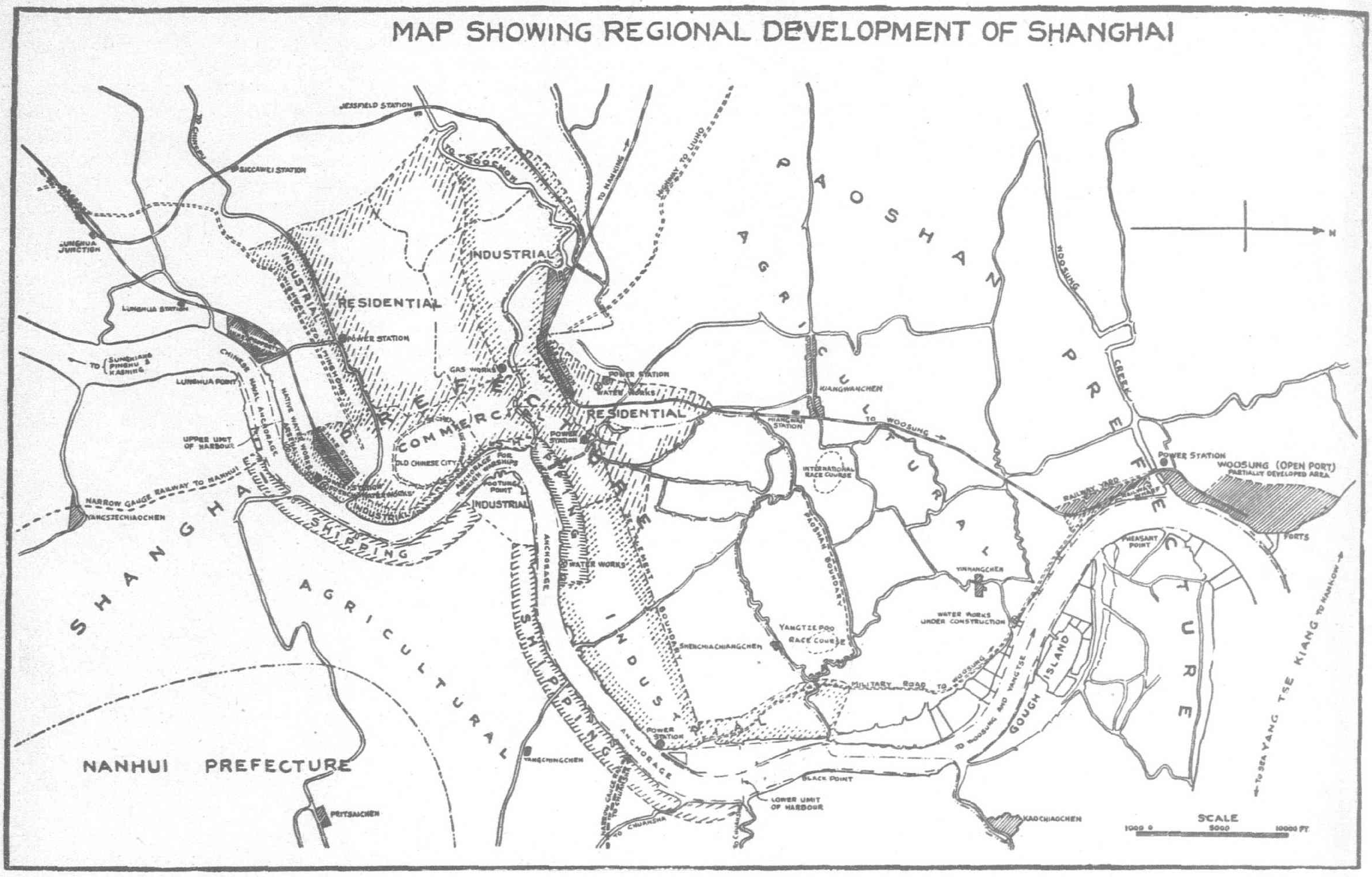
*End of January, 1925, statistics for 1924 specie holdings not being available.

†March 31.

‡Japanese sources do not agree as to this figure.


MAP SHOWING REGIONAL DEVELOPMENT OF SHANGHAI

Greater Shanghai

In a recent editorial comment on Greater Shanghai, the *North-China Daily News* published, the following :—

" The advent of Marshal Sun and Dr. V. K. Ting seems to herald a new day. Unless Marshal Sun's admirable speeches mean nothing, and this we do not believe, a practical effort is to be made to achieve practical progress. Of course much depends upon the amount of public support available amongst Chinese. But there is no lack of men who are genuinely anxious to show China's ability to govern a modern city, by Chinese for Chinese. Mistakes at first there must be. But if the right men will come forward, success should gradually follow. This will be disputed by some. But unless a beginning is made and practical experiments in Chinese municipal government are undertaken, how can foreigners look, with any feeling of safety, towards the not distant day when they may be forced by the exigencies of world policy which rides roughshod over individuals, to surrender the wonderful oasis of clean government which they have created in the midst of the surrounding chaotic and mediæval conditions ? The only wise course must, therefore, be for foreigners, as early and effectually as they can, to assist the Chinese of Shanghai to shoulder and build up a municipal government of a unified greater Shanghai, excluding, for the time being, the Foreign Settlements. In this respect, it seems pertinent to ask : Have the foreigners a policy ? Are they willing to co-operate ? Are the Chinese willing to accept assistance ? Can they do what they are trying to do without foreign aid ? "

As this question affects the development of the metropolis of China, it is important to give some data about what has already been accomplished. The harbour and its approaches, as all will remember, were the subject of careful investigation and definite recommendations made by the Committee of Experts invited for the purpose in 1921. With such amendments as changing conditions may call for, the scheme thus proposed for a Harbour Board or Port Authority appears perfectly designed to meet the situation. The nucleus of such a Board already exists in the Conservancy Board and the Customs Harbour Department. While the proposal has lain dormant for four years, and may be difficult to put into effect, there is at least a definite aim, towards which all interested can work.

It will be useful to consider briefly what might be done towards co-ordinating the agglomeration of towns which makes up the present Shanghai. Obviously the foundation and skeleton of the system is the harbour, *i.e.*, the Whangpoo River, which is, in fact, the very reason for the existence of Shanghai. The main streams of traffic are to and from the river banks, plus a certain amount of subsidiary motion on land parallel to the river. The Soochow Creek forms the basis of a secondary set of similar motions. The development of the foreign-controlled areas has already determined the locations of the principal industrial, shipping and commercial centres on the left bank, and the Chinese areas will gain most by conforming to the traffic lines which have been already established. The most rapid advances will be made by improving the communications between those points in the Chinese areas which are already developing and the principal focuses in the foreign controlled areas. Almost the first desideratum is a *general lay-out* of the whole of Shanghai for the guidance of development, which must certainly include the provision of wide well-made trunk roads between certain points.

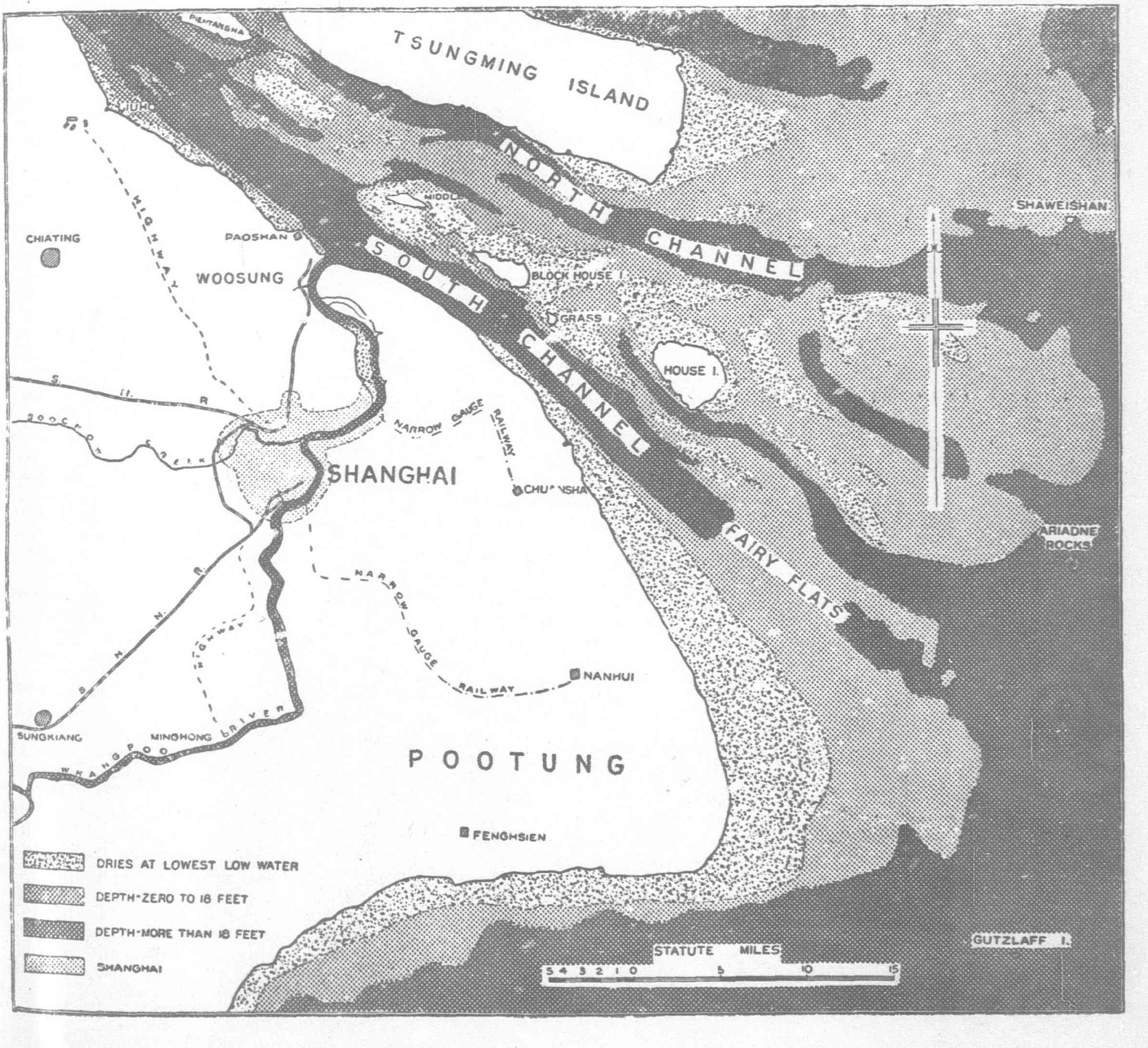
Thus in Chapei there should be at least two through roads with bridges over the Soochow Creek leading from the Northern District of the Settlement to the Western District. Rapid commercial and industrial development would occur in Chapei on such through roads which could be aided by their proximity to the North Railway Station. A bridge across the Soochow Creek at the end of Ferry Road would greatly assist Chapei to develop there. Extensions by Chinese of the foreign Municipal roads near Saw Gin creek would also help greatly in improving eastern Chapei. Chapei has excellent prospects for industrial development if its communications with the Settlements and river are improved. It would be a mistake to impose tolls on any of the roads here.

In the south, the Boulevard de Montigny should be boldly extended direct to the South Station, and great benefit could be obtained by continuing the Rue de Montauban direct through the city also to the South Station. A main wide road behind the riparian properties above the Nantou Bund, continuing the Avenue de Bazure as far as the Kiangnan Dock, is also badly needed. The Nantao Bund should be widened and be kept in order. All these roads should be wide, straight and well made and free of tolls. On the Pootung side the opportunities for development are great. A well laid-out road system with good, rapid, frequent ferry services across the river at two or more points would cause rapid development. It is true that at present the principal business of the Pootung wharves is trans-shipment of cargo, but there are already several factories there, and there would be many more if there were proper road systems.

Still another future industrial area is at beyond the Point, which will be stimulated by the anticipated harbour basins here. In our opinion Woosung should be left alone for the present, as it is too far from the centre of things to play a part until the harbour develops down to it. Its only immediate possibilities are for landing passengers from ocean steamers and as a steamer-to-rail transfer point.

How are these things to be paid for and maintained? The solution of this question is just as important as a sound design, and much more difficult. It is futile to talk of organizing Greater Shanghai unless there is a sound financial basis. We do not know exactly what the system of taxation in the Chinese areas is, but feel quite sure that it needs to be greatly simplified. All taxes should be collected in gross at a control office, and all expenditures should be regulated therefrom and every cent should be recorded. Above all, there should be *full publicity as to both the amounts collected and the details of expenditure, without any camouflaging of squeezes.* For the purpose of executing the road widenings, etc., loans must be raised, and the funds should be kept in reliable banks, with a proper system for interest payment and amortization, and every official concerned in the spending of the money should be guaranteed financially by responsible people who will fully make good any defaults. We feel very strongly that unless the scheme proceeds on these lines with regard to finance it will fail. Human nature is weak and is best controlled by publicity. The habit of taking commissions is rife in China and can only be cured, as it has been cured in other countries, by controlling the appointment of officials so that merit and probity are essential qualifications, paying them good salaries and compelling them to publish full accounts of their expenditure. We feel sure that *without any large increase* over the

(Continued on page 316).



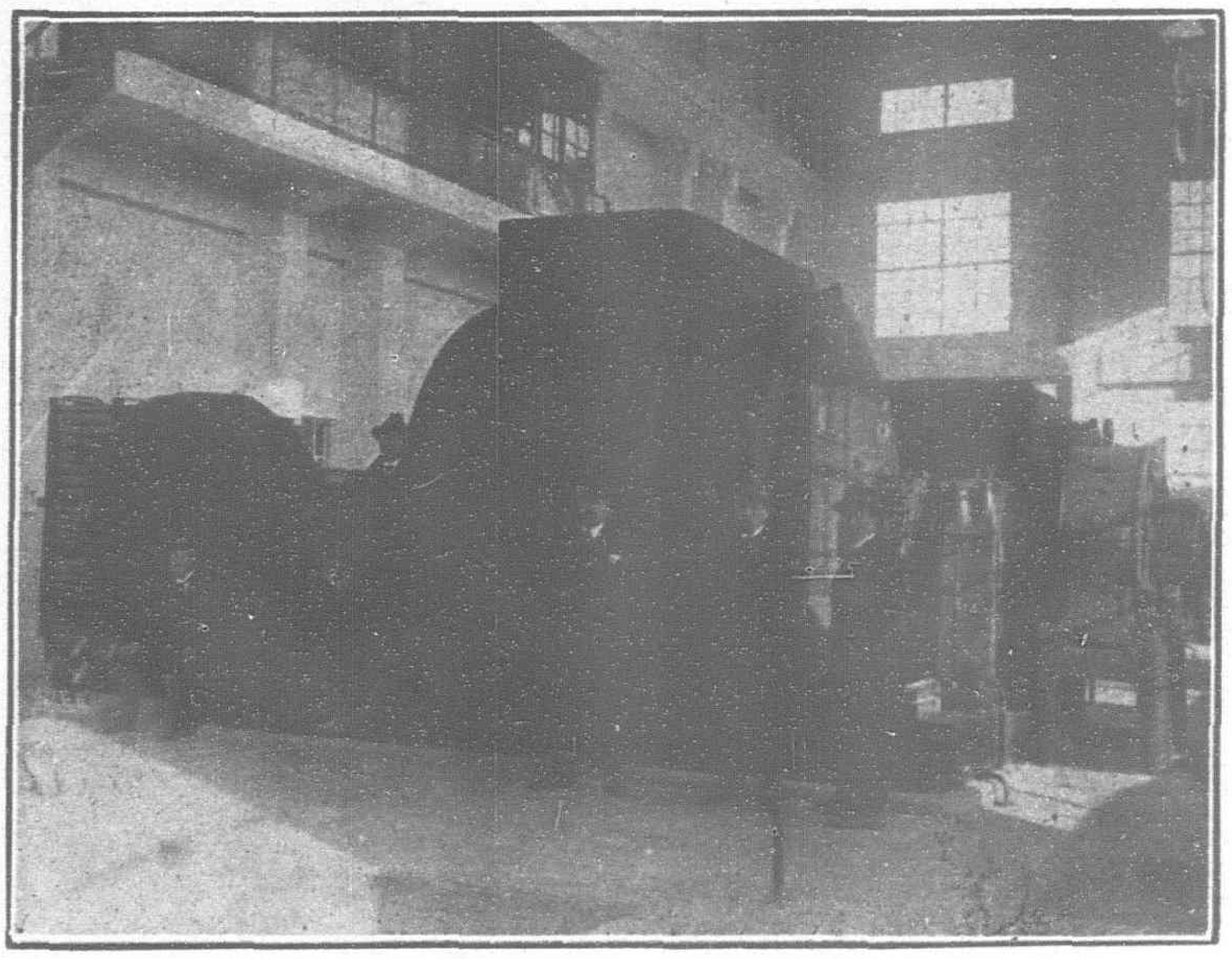
Electrical Development in Tokyo

By I. F. Baker

THE city of Tokyo, Japan, is viewing with considerable pride the recent advances that it is making in the field of power supply. A summary of hydraulic power resources of the Tokyo Electric Light Company reveals that there are 300,000 kw. in operation, 70,000 kw. in the process of construction, and 230,000 kw. projected. Truly, when one takes into consideration the power to be derived from Daido, Kinugawa, Nippon Denryoku and the new consolidation of Gumma and Hatakawa, called the Tokyo Electric Power Company, this city of the Orient can be called the Million Kilowatt City of the Far East, since the latter companies have 100,000 kw. supply, 200,000 in construction and 200,000 projected.

This rapid expansion had its origin in the initial Inawashiro development in 1912. At that time Dr. Sengoku, now Minister of Railways, was President of the Inawashiro Power Company. After an inspection of high voltage equipment in the States he purchased the first extra high tension plant ever installed in Japan. The equipment was designed for 115,000 volts and included 100,000 kw. of Westinghouse transformers and switch gear.

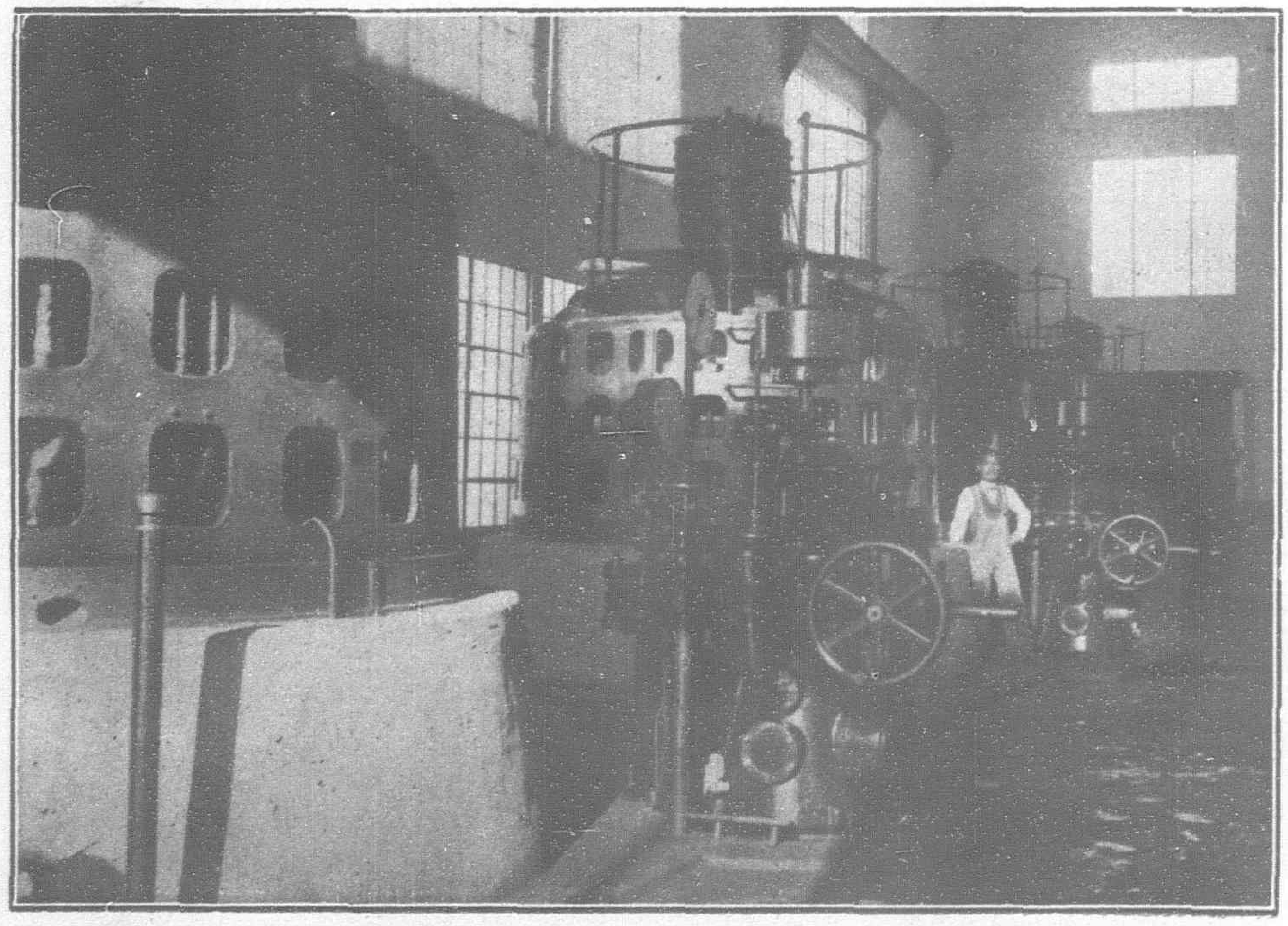
This installation was so successful under the operation of Dr. H. Tachikawa, Chief Engineer, that a second addition was made in 1917. In 1922 the Gumma Power Company built a similar line from their Kanai and Shibukawa Power Stations near Maebashi to the substation at Kawasaki.



15,000 K.V.A. Westinghouse Synchronous Condensers

Up until this time the waters of Lake Inawashiro, an ideal storage reservoir, had not been used to any great extent in the power development. However, the amalgamation of the Inawashiro Hydro-electric Company and the great Tokyo Electric Superpower System in 1923 produced a decision to utilize this available storage.

As a result great power was demanded, necessitating an increase in voltage from 115,000 to 154,000, and quadrupling the volume of the giant switches. The most outstanding feature, however, was that it brought into use the largest water cooled transformers in the world. The substation transformers had been of the 4,000 kv-a. type, but the new development required that each become 25,000 kv-a. When completed this development mounted to 250,000 kw.



Westinghouse Generators at the Komatsu Power Plant of the Tokyo Electric Light Co.

The hydro-electric plants first installed some fifteen years ago send 100,000 kw. of power at 55,000 volts and 77,000 volts by three transmission lines to stations at Meijiro, Waseda and Yodobashi.

The Keihin (Tokyo-Yokohama Line) was orginally designed to bring power from the Ryushima Station to the Totsuka substation near Yokohama. Later, power stations were built on the Takase River to supplement power for Yokohama. However, recent power demands in Tokyo have resulted in a connection with the Keihin high tension line at Shiojiri through seven 10,000 kv-a. Westinghouse transformers to tap the great Daido system. This extra Daido power is then stepped down by a 50,000 kv-a. Westinghouse transformer bank, at Hashimoto, to 66,000 volts, and conveyed to Senzoku substation near Tokyo. Thus is effected a tie between Tokyo and Osaka which will, in future years, feed power back and forth according to the relative demands of those two great centers of industry and population.

Perhaps the most important of the high tension lines of the Tokyo Electric Light Company is the Joetsu 154,000 volt line, bringing 50,000 kw. of power from the two generating stations on the Nakatsugawa River to the Kameido Station in Tokyo.

Other power stations are tapped into this line at two points. At Keyatsuki four 7,000 kv-a. self-cooled transformers step up power from four 4,375 kv-a. generators at Yuzawa, and at Komatsu are four giant transformers each of 21,000 *kv-a. capacity. These step up power* from the Iwamuro, Komatsu, Kamikuya No. 1 and Kamikuya No. 2 Stations. The total power of this line is poured into the Kameido substation at Tokyo, which has nine 15,000 kv-a. transformers, with three 15,000 kv-a. synchronous condensers for regulating the voltage.

When Joetsu is increased by installing a 50,000 kw. generating station on the Shinana River, the total power from this one line will amount to over 250,000 kw.

Naturally, this hydro-electric power becomes diminished at certain seasons of the year, and to assure maximum efficiency from the system it is desirable to have standby steam plants. Hence work is already proceeding rapidly on a new steam station in Tokyo, in which two 25,000 kw. Westinghouse steam turbines will be installed.

(Continued on page 308).

Deep-Draft Wharves in the Whangpoo

THIS paper represents an analysis of several investigations, tests and studies on wharf design made by the Whangpoo Conservancy Board's engineering staff, including the writer, at different times, especially in connection with and following the Shanghai Harbor Investigation 1919-1921, undertaken by the Board in order to investigate the technical and economical problems involved in a further development of the Shanghai Harbor. Its preparation is made at the request of the Engineer-in-Chief of the Conservancy Board and presented to the Engineering Society with his consent.

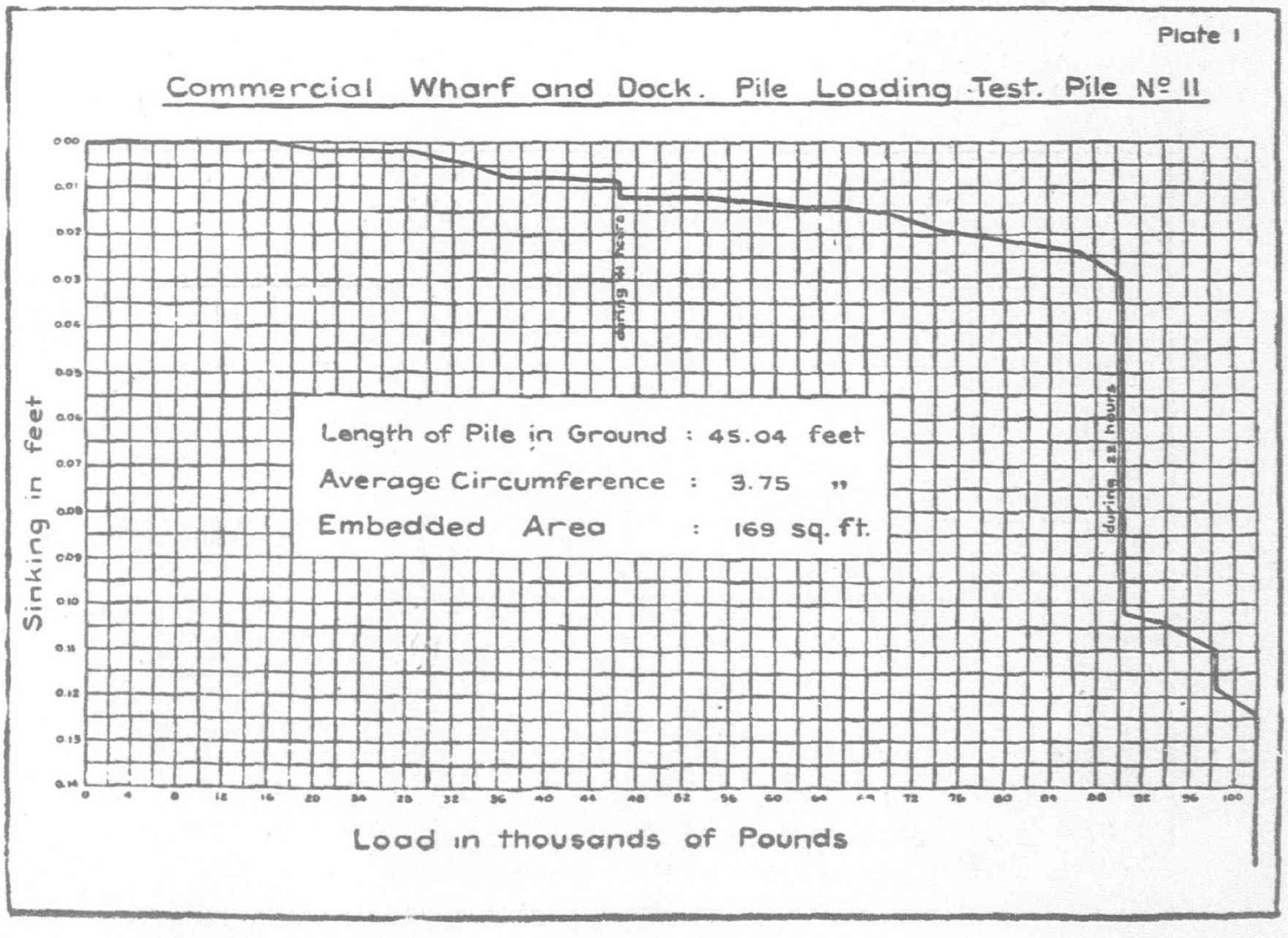
Before proceeding with the details of the paper it should be stated that the type of wharf to be discussed is that for an open tidal harbor and not one for a closed dock. Although the cost per foot of the latter is lower than that of the former, the cost of a harbor unit of the latter type, on the other hand, is at present higher, the cost of locks, etc. exceeding the saving in other respects. The Committee of Consulting Engineers, Shanghai Harbor Investigation, 1921, definitely recommended docks of the open type to be built in the first instance. The definition of a " deep-draft wharf " might be put as a wharf to accommodate ocean-going vessels, *i.e.*, ships requiring a berth with say 26-ft. depth and more at low water.

Amongst the factors that affect the design of a deep-draft wharf in the Whangpoo the following six will be discussed in this paper :—

(*a*) nature of soil and subsoil
(*b*) non-salinity of the river water
(*c*) tides and currents
(*d*) climate
(*e*) factors of general character
(*f*) materials and labor

The three first mentioned factors having been subjected to special investigations, will consequently be dealt with more extensively, while the three latter will be only touched upon.

An attempt will be made to illustrate the characteristics of these six groups and after determination of their influence in connection with the design to sketch out the most economical type of wharf according to local conditions.



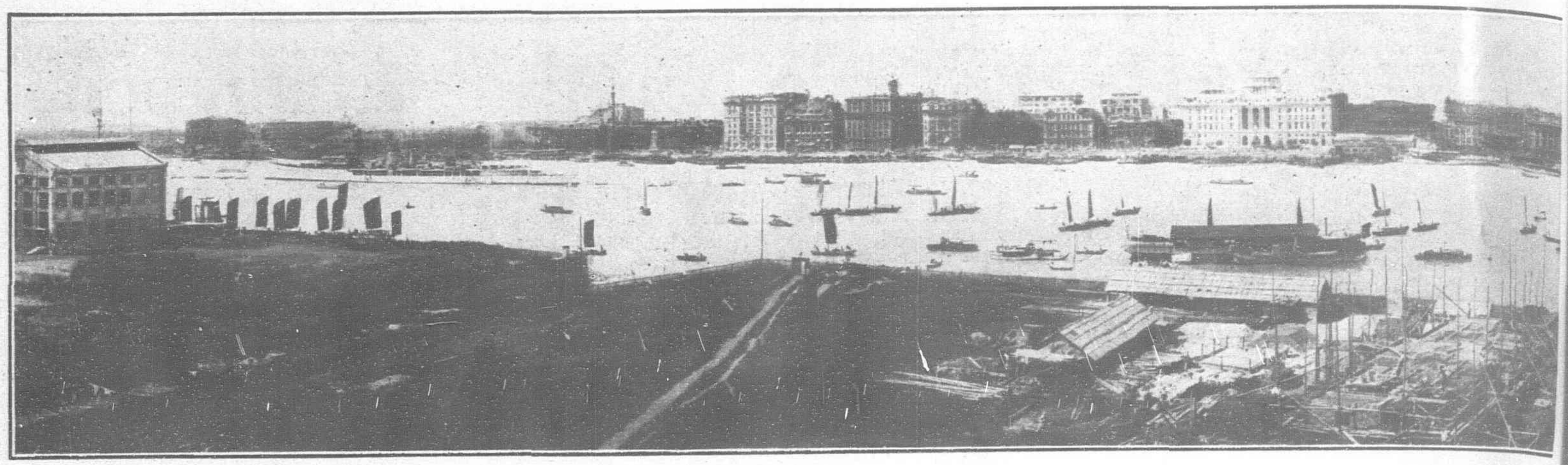
The Nature of the Soil and Subsoil

Extensive investigations as to the character of the soil and the subsoil in the Shanghai district were undertaken in connection with the Shanghai Harbor Investigation and the results thereof have been published in the Board's S. H. I. Series Report No. 7 on " Special Investigations." It was found that blue clay predominates to a depth varying from 65 to 135 feet intersected at various levels by thin layers of fine sand. Solid bottom has not been found in the vicinity of Shanghai or along the Whangpoo. The properties of the clay have also been carefully studied and it has been proved that the clay is a material of a certain elasticity and that cohesion plays an appreciable part in its behavior. The character of the soil and the subsoil effects the stability of structures along the waterfront both with regard to its bearing power and also on account of the horizontal thrust it exercises on the structures.

The low bearing power of the ground, which is well-known to engineers and architects in Shanghai, necessitates a wharf construction as light as possible, *i.e.*, a pile-structure. The question as to the bearing power of piles in relation to the soil then arises. This problem has been subject to considerable study both by the Municipal Authorities and by private engineers. The most thorough tests are probably those carried out by the Whangpoo Conservancy Board made firstly in connection with the Shanghai Harbor Investigation and continued later.

The tests have recently been brought to a conclusion and the results can be summarized as follows :—

1. On account of the clayey properties of the soil pile-*driving* tests will not give any true indication of the bearing power of piles in relation to the soil. This can only be obtained from series of pile *loading* tests wherein the movement of the pile in regard to the soil under increased load must be studied. Tests with intermittent load are of greatest importance in connection with wharf structures where the live load may be five times as much as the dead load.
2. The relation between load and settlement of the pile (also unloading and recovery of the settlement within certain limits) indicate elastic conditions. See Plate 1, where a typical loading test of a pile is illustrated. In working out the results of the Board's tests an attempt has been made to consider the problem of " friction-piling " in accordance with the theory of elasticity. According to such a theory the failure of a pile under load is due to the ultimate shearing strength of the clay being exceeded. On this basis and in accordance with the actual tests made the following laws have been arrived at.
3. Wooden piles and piles of reinforced concrete of similar shape have the same bearing power per unit area of submerged part.
4. Round, tapered piles have higher bearing power than straight piles of square section.
5. The *safe* bearing

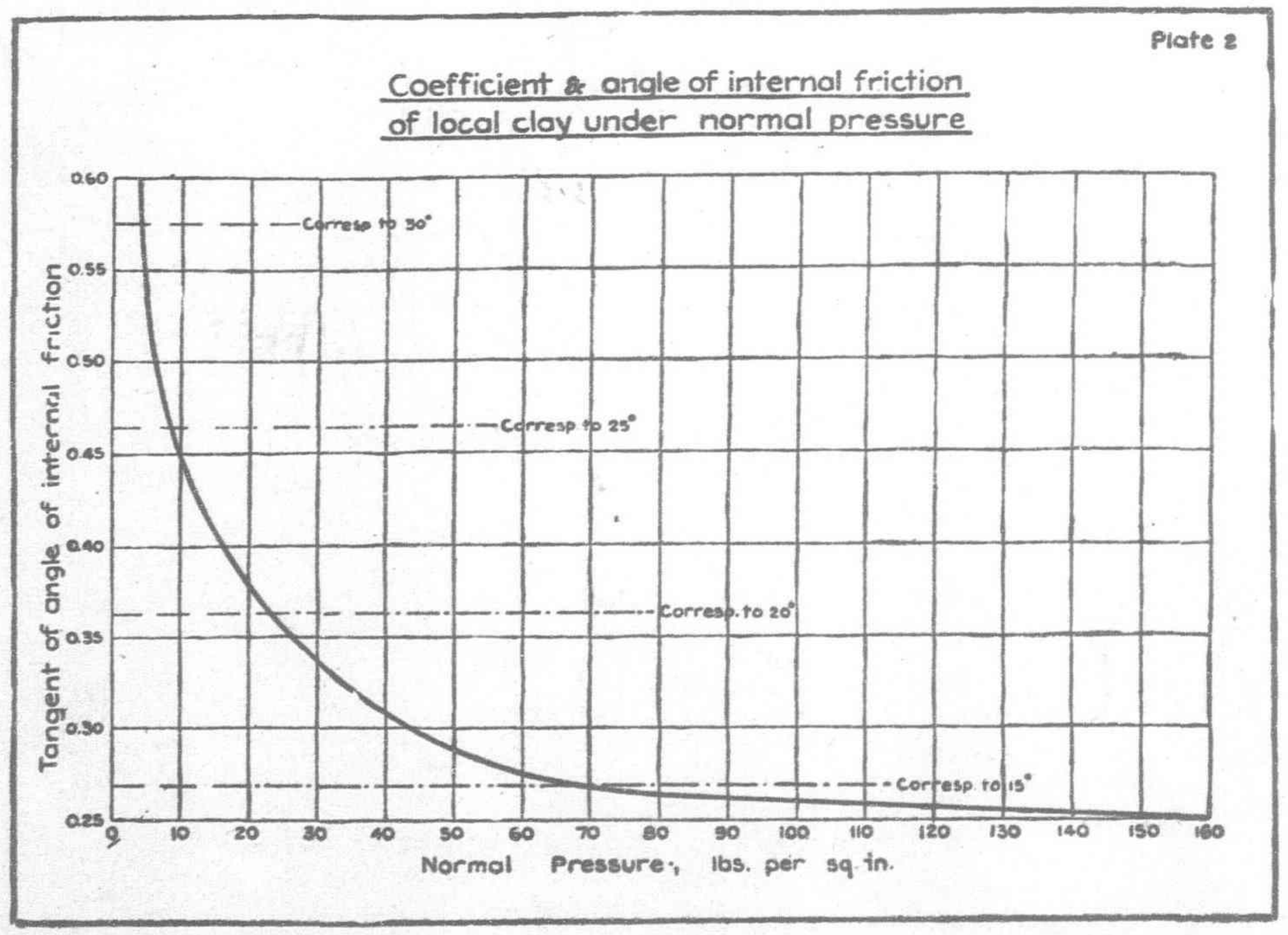


The Bund, Shanghai

power of piles of different shapes used in foundations for various types of superstructures is proposed as follows :—

Type of Superstructuer	Approx. Relation between Live load and Dead load	Safe bearing power in lbs/sq. ft. of submerged area of pile	
		Round, tapered piles	Square, straight piles
1-storey buildings	1/1	350	200
Residential and Office buildings of several stories ..	1/1	250	145
Godowns of several stories ..	2/1	200	115
Wharves and similar structures with intermittent load	5/1	150	85

The second point to consider with regard to the nature of the soil and the subsoil was the lateral pressure of the backing and the stability of the structure in a horizontal direction. The intensity of the lateral pressure varies with the angle of internal friction of the clay, which itself decreases under increased pressure. From actual experience of failures in the clay (slides at three different places on the river front) the diagram on Plate 2 has been made and shows that an angle of friction at least as low as 18° must be used when the vertical pressure on the clay reaches a value of 6,500 pounds per square foot (weight of backing and super-imposed load). A deep sheet-piling is required in order to prevent undercutting and the riverbank as a whole has to be stabilized by the wharf piling which must be carried down to sufficient depth on this account.



Non-Salinity of the River Water

The quality of the water has marked influence on the materials for wharf-construction, reinforced concrete and timer being the principal ones. Brackish waters furnish conditions unsuitable for both kinds. It is now a known fact that concrete cannot withstand the attack of destructive factors occurring in sea water. Rock bring molluscs as well as sulphates in sea water attack the concrete and cause a steady deterioration. Reinforced concrete piles especially are bound to be most seriously affected as the reinforcing steel when the salt water enters will corrode and swell, causing the pile to crack and speedily disintegrate. A cement of absolute indecomposibility in sulphates waters is now on the market and knowu as *ciment fondu* or in America as "Alca" cement. The properties of this alumina-calcium cement are in addition to the above as follows :—

1. Slow setting--quick hardening
2. Increased strength.

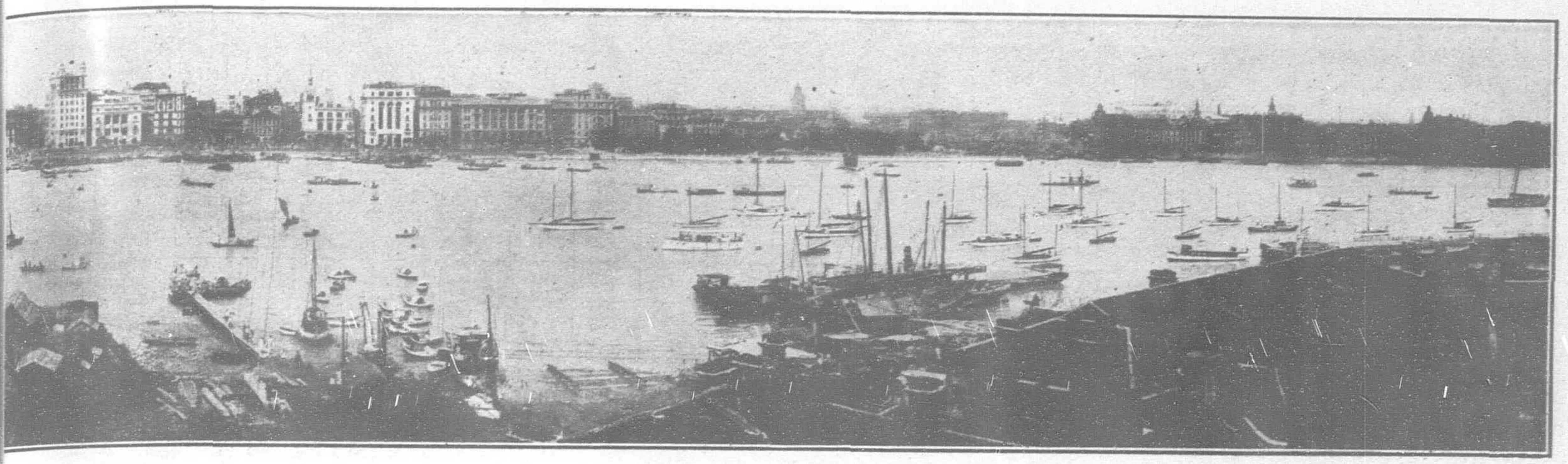
The price, however, of this new cement is about double that of Portland cement, and its resistance to rock bring animals has not been ascertained. Concrete is probably not yet a material of permanence in sea water.

Timber is also exposed to a grave danger in salt water through the presence of marine borers, of which there are two classes, the mollusc and the crustacean types. The former are also known as "shipworms." Of the first class the *Teredo navalis* and of the second class *Limnoria terebrans* are the best known and most dangerous. One feature common to all these marine borers is that a salt water habitat is essential to their existence, a minimum salinity of 0.6-0.7% being necessary. The warmer the climate, the better they thrive and the larger they grow. Marine borers are present in the China Seas and timber structures, in Hongkong and Tsingtao for instance, are injuriously affected according to reports. According to Schulze (Seehafenbau, Band 1) a variety of the Teredo navalis, *Teredo* gigantea is said to live in the South Chinese waters and to attain a length of 6-ft. and a diameter of 2 to 3 inches.

The harder the wood the more resistance is presented to attack by the marine borers.

The life of pile timber in Hongkong is reported by the Harbor Master there to be about 9 months for China Fir, 3 to 5 years for Borneo Hardwoods, 8 to 10 years for Yocal and about 15 years for Billian. The injury to timber piles from marine borers has been enormous in some places. In San Francisco, for instance, damage valued at U.S. $15,000,000 was done during 1920-1921.

It is entirely thanks to the fresh-water discharge of the Yangtze and the Whangpoo that the Shanghai Harbor is spared. Nothing but a considerable decrease of the fresh water discharge of the Yangtze covering a long period would, by the admission of brackish water, furnish conditions suitable for the development of the marine borers. As this is a very unlikely occurrence, timber structures in the Shanghai Harbor will most probably enjoy permanent immunity from this particular pest.



Another View of the Bund

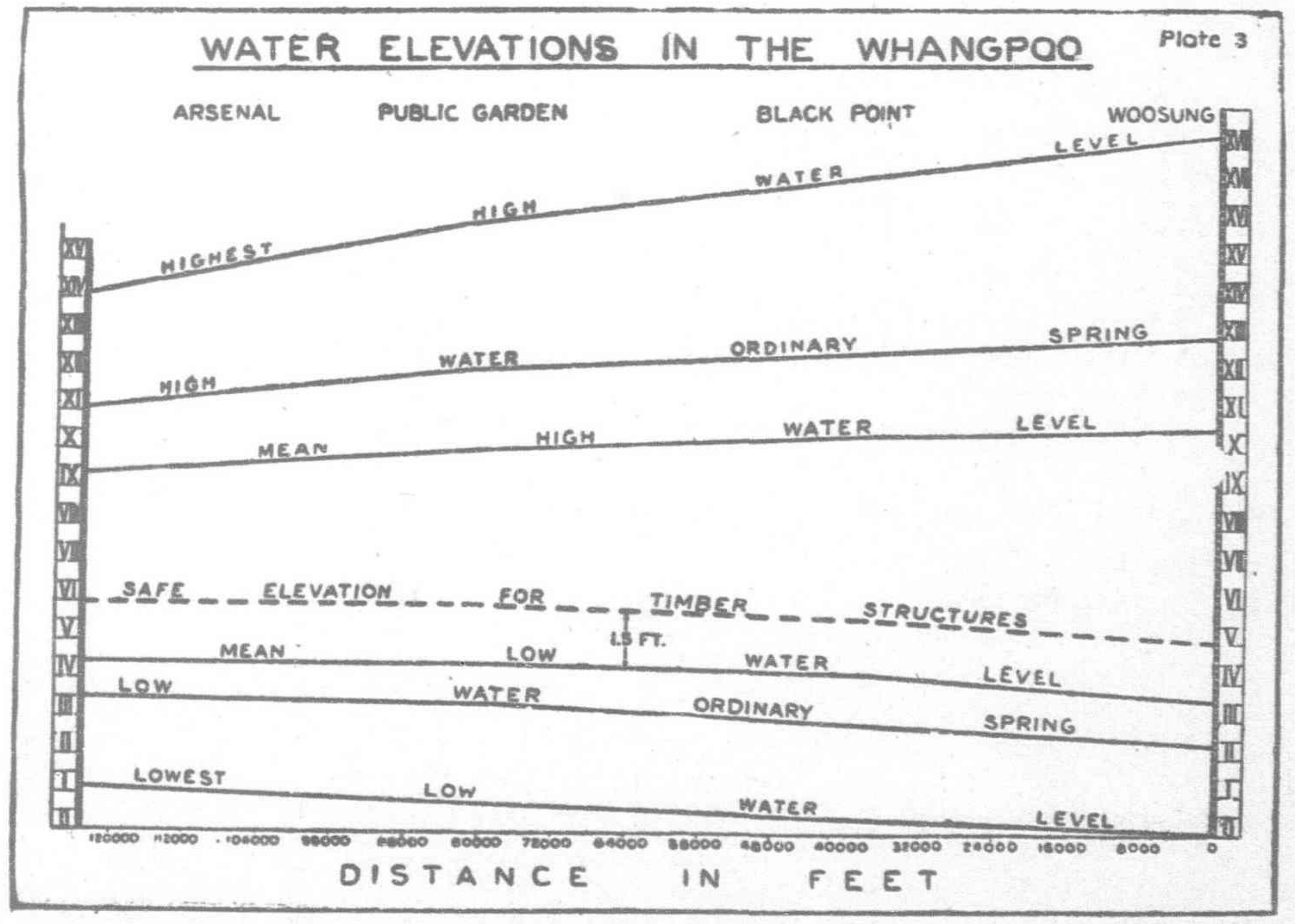
In a recent investigation as to the decay of timber piles in the Whangpoo 44 piles along the water front from Lunghua to Woosung were tested and none of them showed any sign of having been attacked by marine borers. The maximum salinity recorded for the Whangpoo is 0.3 per cent. and occurred February 3, 1923 in connection with extreme low water stage in the Yangtze.

The general effect of moisture on the strength of timber is a factor of great importance and must be mentioned in this connection. Compression test on blocks cut out from old piles in the Whangpoo indicate a reduction in strength of about 25 per cent. The ultimate strength obtained in Oregon Pine is usually 4,000 lbs./sq. inch or thereabout while the tests referred to indicate an ultimate strength of not more than 3,000 lbs./sq. inch.

Tides and Currents

In a harbor where tidal conditions obtain the question arises whether an open harbor or a locked harbor is the more economical. In connection with the Shanghai Harbor Investigation this question was duly dealt with and the open system was found to be the more economical. The Shanghai Harbor should therefore in the first instance be developed according to the open system and the influence of tides has to be taken into consideration in designing the wharves. This means that a wharf will have an additional height according to the range of the tide. On Plate 3 the principal water levels in the Whangpoo are given. The wharf plane need not be higher than 2 feet above Highest High Water or plus 20-ft. W.H.Z. at Woosung and plus 16-ft. W.H.Z. at Lunghua.

In a composite wharf structure where timber piles and reinforced concrete superstructure are used the question as to the safe elevation for timber piles with regard to decay arises. That timber remains sound for an indefinite period below the water surface in fresh water is well-known but where tidal conditions obtain and the water level is consequently changing, the elevation below which timber is safe from decay does not declare itself *a priori*. Mariners say that this elevation lies "between wind and water" which gives the cause rather than the extent of the damage.



Information as to the experience on this subject in other tidal harbors is rather scanty. In order to arrive at a conclusion as to the extent of the decay of timber piles in the Whangpoo it was decided to make borings in the existing pile structures along the water-front from lowest low water and upwards and study the core with regard to its soundness. Through the courtesy of a number of wharf-owners at Shanghai the Whangpoo Conservancy Board obtained permission to bore out samples of the timber piles in their wharf-structures for the study of the decay, and thanks to their assistance it was possible to gather samples from 44 piles of different age and material between Woosung and Lunghua and on the basis thereof form an opinion as to the subject. The dotted line in the Plate 3 shows the result, which according to the writer's opinion is a reasonable compromise between the two important sides of the question, *i.e.*, the necessity of keeping the timber below a plane where it is absolutely safe from decay and the desirability of cutting the timber at an elevation as high as possible in order to avoid expensive labor.

The effect of the tidal currents on a pile-structure is of a very important nature and has to be taken into consideration for the design of the substructure. Current observations in the Whangpoo along the Normal Line in deep water (at Woosung and Gough Island) have been made and give a velocity of 4.5-ft./sec., with a tidal range of 9.9-ft. as represented on Plate 4. With maximum range of 13.3-ft. at these places the maximum velocity produced will be about 6.0-ft./sec. This current exercises on the pile an almost uniformity distributed horizontal pressure

$$P=k\frac{w a v2}{g}$$

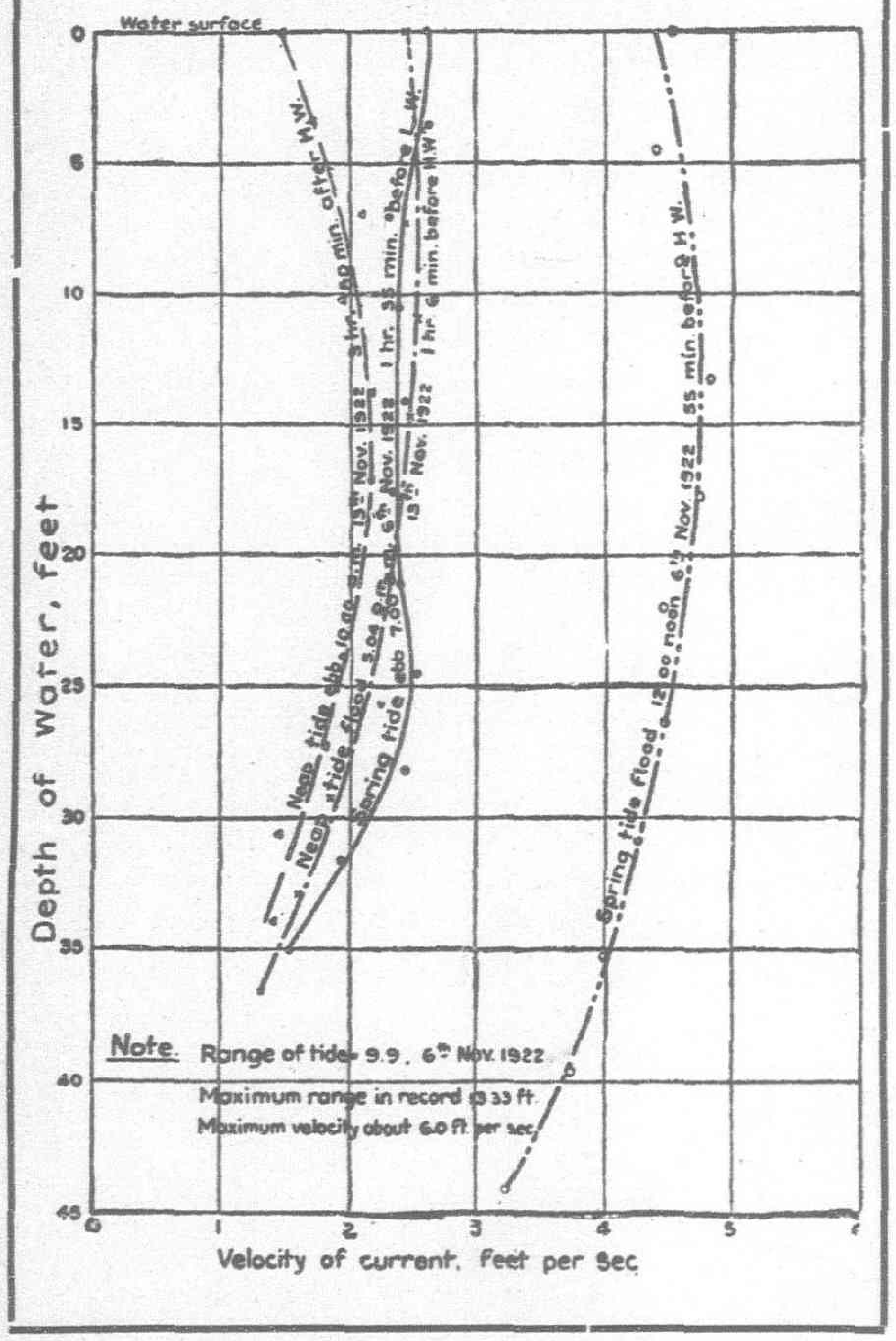
where v=velocity in ft./sec., g=32.0-ft./sec.,2 a=area of submerged part w-weight of water per cu. ft. and ka factor, varying with the shape of pile. Actual tests have given k=0.75 for square piles and k will probably be about 0.6 for round piles. The pressure P will then be expressed in lbs. per square foot of submerged area. The pile evidently acts as a beam on two supports with an almost uniformly distributed load. With a depth of 30-ft. which means a span of about 36-ft. and currents of the above strength *the pile is subject to a considerable stress on this account only.* The working stress of a pile is also reduced in proportion to its length due to column action. By the combination of these two factors a limit for ordinary pile structures is soon obtained. A graphical representation hereof is given on Plate 5, which is figured out for a standard Douglas Fir pile.

Climate

Shanghai's warm and humid climate during the summer months affects unfavourably timber structures above a certain level and causes a rapid decay as mentioned before. The winter climate, on the other hand, is very favorable. The water in the river does not freeze and floating ice, which otherwise produces an irresistible force and easily crushes and destroys wharf structures, hardly occurs. A superstructure of reinforced concrete will in the long run be cheaper than one of timber in spite of higher prime cost, due to the rapid decay and consequent expensive maintenance.

Plate 4

Velocity of Current at Woosung

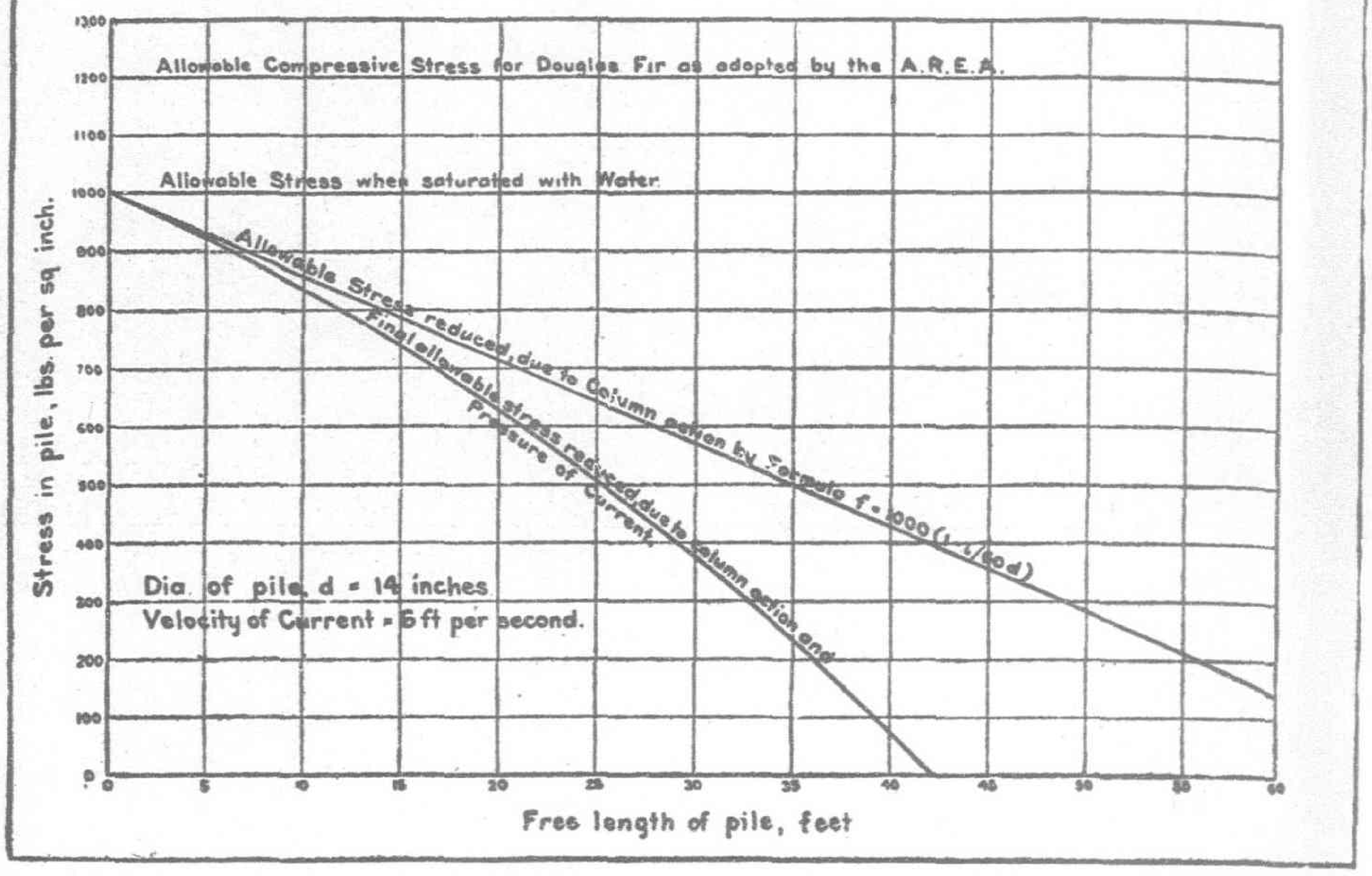


Factors of General Character

The heavy wear and tear of a wharf-deck and the mechanical abrasion caused by ships, etc., are factors of general character and independent of local conditions. They favour a permanent and rigid superstructure. To the high maintenance cost of a timber deck must be added the loss of income during the period of reconstruction. If furthermore the fire-risk is taken into consideration the general conclusion must be that a superstructure of reinforced concrete is preferable to one of timber.

Plate 5

Allowable Unit Stress for Douglas Fir Piling



Materials and Labour

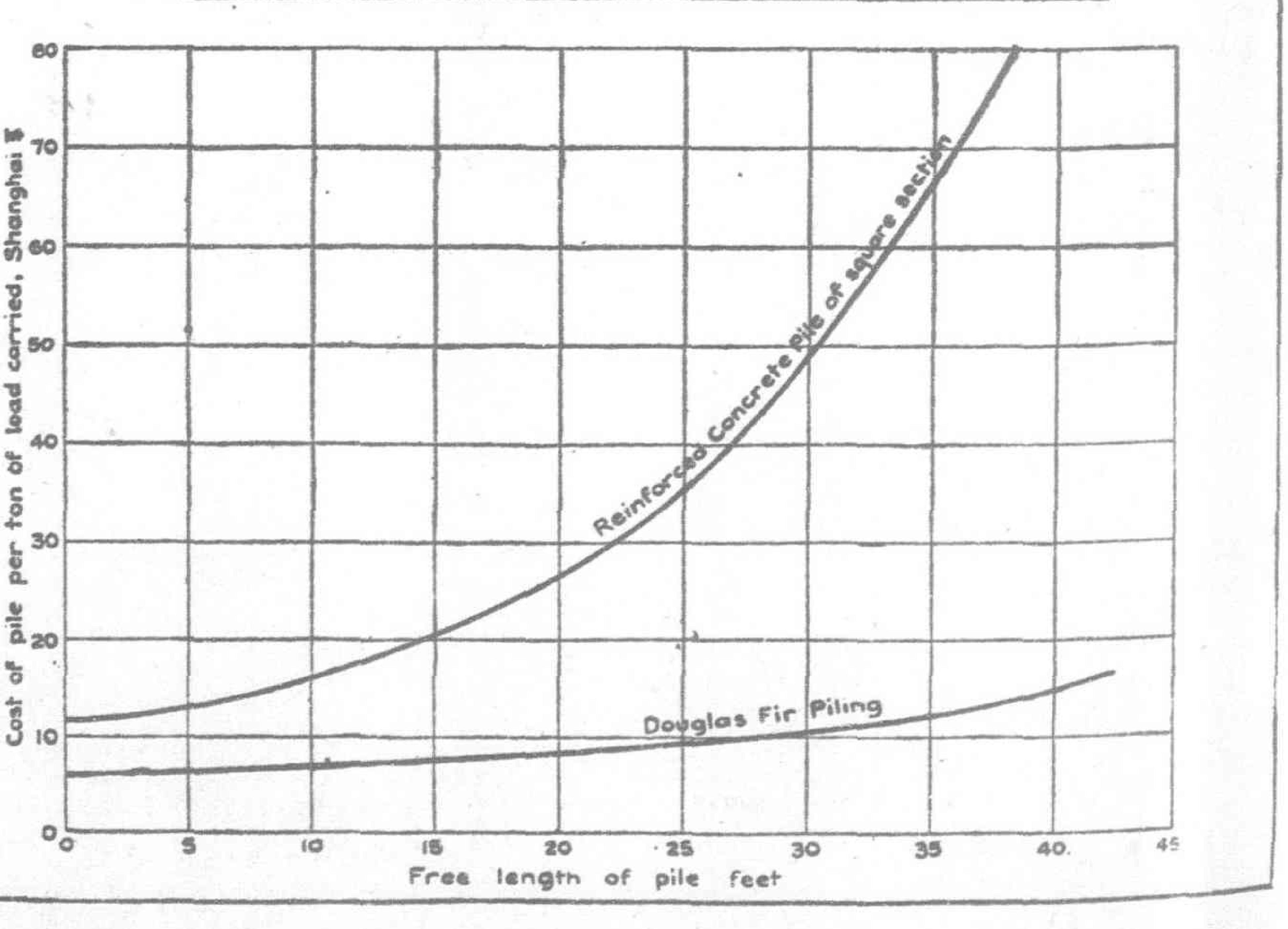
As mentioned before the principal materials used in wharf-construction are reinforced concrete and timber. Locally manufactured cement can now be had at a very reasonable price and European reinforcing steel is at present offered on the market at cheap rates. The importance of a good concrete sand should be mentioned in this connection. The granular gradation of the commonly used Ningpo or Yellow sand is characterized by very fine and uniform grains and they form a very poor concrete. It has been proved in several tests made by the Whangpoo Conservancy Board that an increase of 100 per cent. in the compressive strength of cement mortar can be obtained by substituting for Ningpo sand a coarse uneven sand, which has been obtained locally at a slightly higher cost than the other. An absolutely reliable and first class reinforced concrete can thus be produced in Shanghai. The cost of same has had a tendency to decline during recent years. The cost of labor is advancing and will probably continue to do so in the future. Most of the timber used in Shanghai is Oregon Pine. For many years to come timber of this quality will have to be imported and the price of same will consequently be dependent on conditions in the foreign countries where it is cut. At present the cost of Oregon Pine has a tendency to go up.

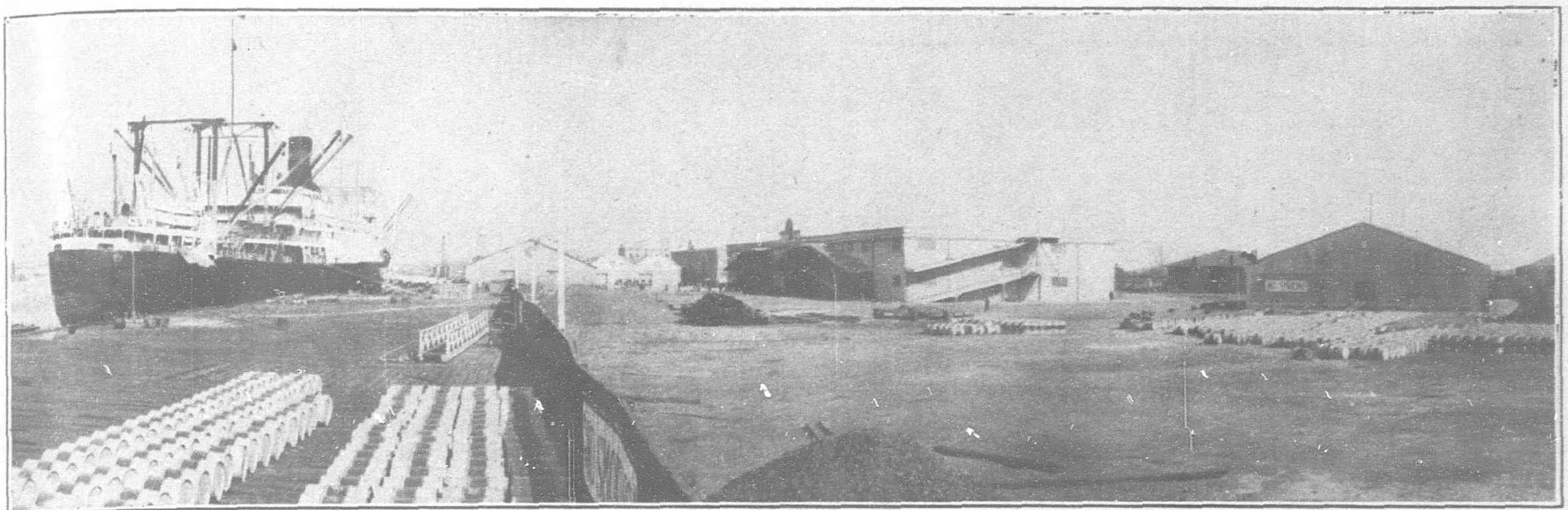
In the economic calculations in the next section the following unit prices have been used.

Cement, Tls. 3.25 per cask; Steel, 75.00 per ton; Coarse 1.65 per cu. yd.; Fine Gravel, 2.50 per cu. yd.; Oregon Pine timber, 75.00 per 1,000 sup. ft. B.M. as base price; Douglas Fir Piling, 1.00 per running ft.; Labor, $0.40-1.00 per man-day.

Plate 6

Comparative Cost of timber & Reinforced Concrete Piles





Unloading at Pootung

The Design

The problem of wharf designing naturally resolves itself into two, parts, *i.e.* the design of the super structure, and the design of the substructure, which must each be considered separately :

A. *Superstructure.* The results of the analysis of the various factors affecting the design of a wharf superstructure as outlined in the previous sections of the paper can be summarized as follows :—

1. A light, rigid construction is desirable.
2. A permanent construction with as small maintenance cost as possible is preferable.

It can therefore be proved that the most economical type of superstructure is a *light reinforced-concrete construction.* The deck developed as a slab and beam design supported by thin walls or trusses at distances of 15-20-ft. has been found economical. With regard to the flow of the water the open truss might be preferable to the wall-type. The width of the wharf-apron and the arrangement of sheds, cranes, tracks, etc. do not affect the choice of the type which can be arranged to suit different purposes. The live load on a wharf is dependent on the utilization of the wharf and usually varies from 400 to 1,000 lbs. per sq. ft.

B. *Substructure.* The above study of the various factors affecting the substructure gave as a result :—

1. A light pile structure is essential.
2. Both timber and reinforced concrete are permanent in submarine structures in the Whangpoo.
3. Round, tapered piles have higher bearing capacity in the local soil than square, straight piles.

The preference for timber piles or reinforced concrete piles is only a matter of cost as either can be used in connection with the superstructure already decided upon. On

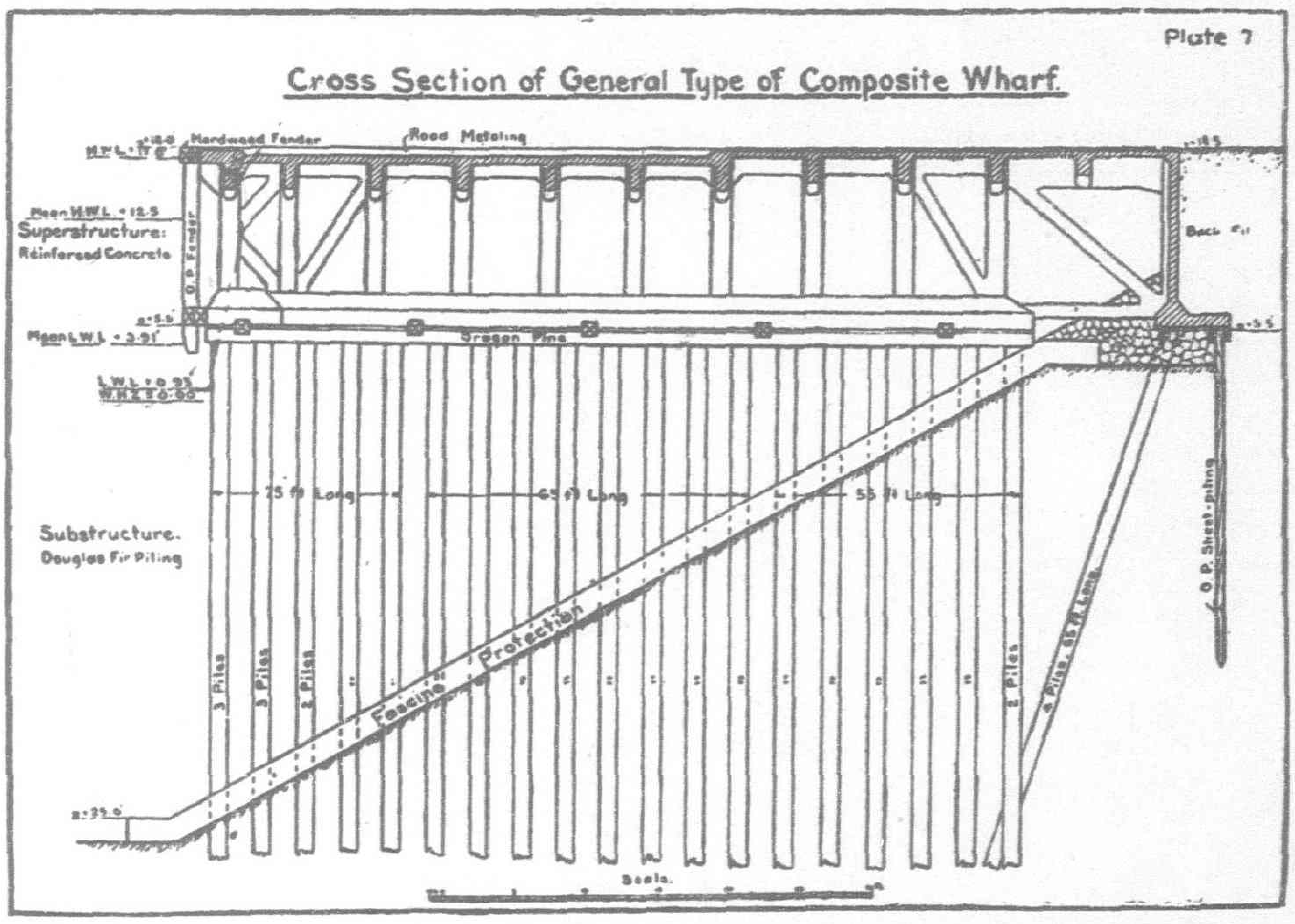


Plate 7

Cross Section of General Type of Composite Wharf.

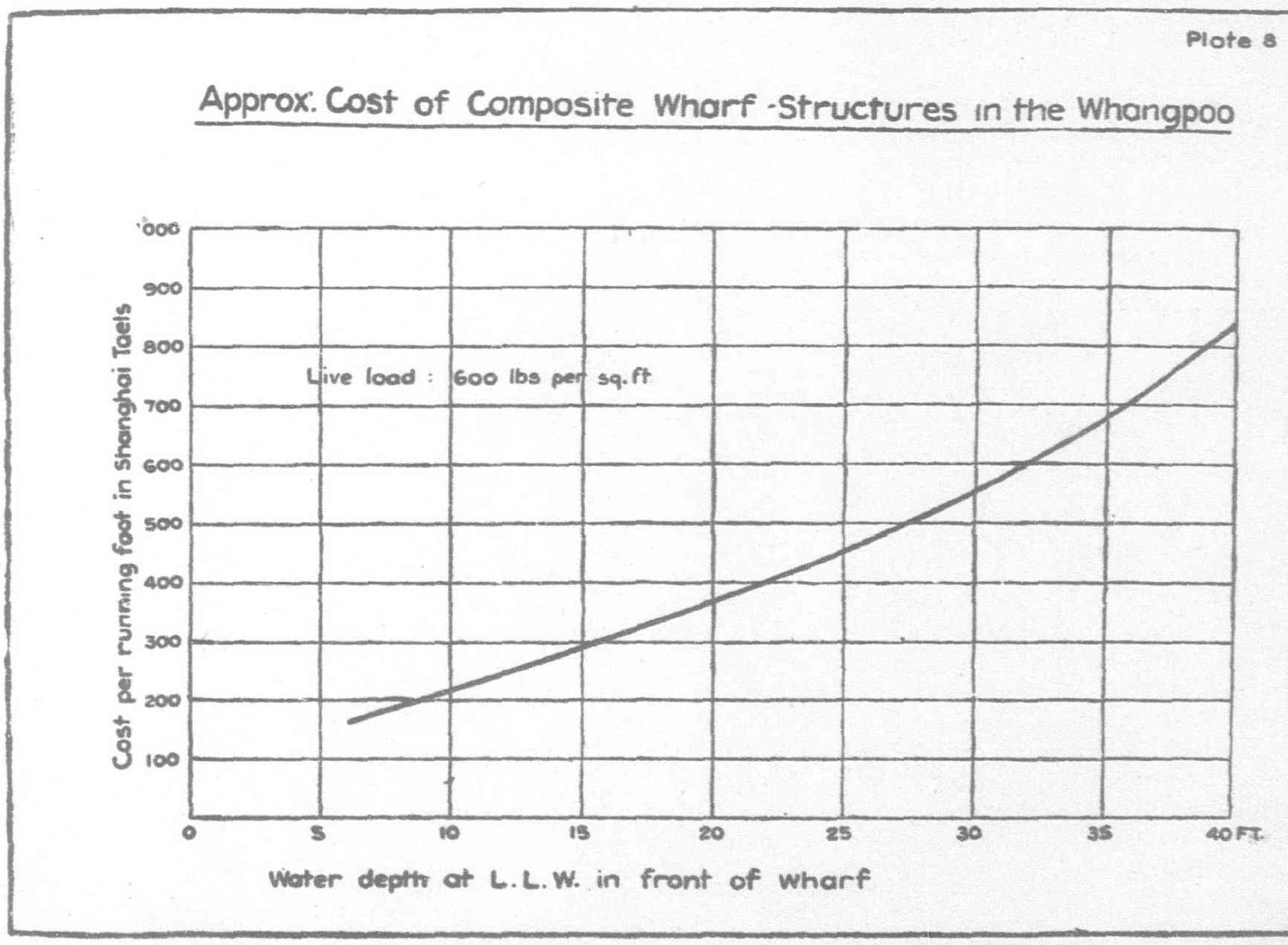


Plate 8

Approx: Cost of Composite Wharf-Structures in the Whangpoo

Plate 6 a graphical representation of the estimated cost of piles of both kinds at various depths is shown. Due consideration has been taken in the calculations to all the factors mentioned above. As a result it is found that timber piling is at present the more economical type of substructure for a wharf in the Whangpoo.

The Dollar Wharf, Pootung, Shanghai

Conclusions

The type of wharf as shown on Plate 7 has been found by the above analysis of various factors involved to be the most suitable and economical for local conditions. The more recent wharf-structures in the Whangpoo such as Holt's Wharf with extensions, the Shanghai and Hongkew Wharf Co.'s Pootung Wharf, the N.Y.K.'s Pootung Wharf and the public wharves planned by Whangpoo Conservancy Board belong all more or less to this type. A diagram of approximate cost of wharves of this type with various depths alongside is shown on Plate 8.

The cost of wharves in the Whangpoo is quite reasonable owing to the favourable circumstances mentioned above. In the case of the Shanghai harbor, its protected position, excellent river and canal connections and the many favourable conditions for the construction of wharves in the Whangpoo, perhaps more than counterbalance its drawbacks with regard to approaches. It is comparatively easy to show that the cost of constructing a suitable deep draft wharf in the Shanghai harbor is so much less than would be the case in a new marine harbor that the saving on that account for a large frontage would more than cover the probable cost of improving the approaches to Shanghai.

Pekin Syndicate

THE report of the Pekin Syndicate for the year ended June 30, 1925, which has been delayed owing to the general conditions of affairs in Central China, made its appearance in April, 1926. The directors state that the receipts amounted to £99,824, comprising interest on loans, deposit and current accounts, dividends on shares, commission and transfer fees, £43,520 5s. 5d., and profit on collieries, £56,304.

The expenditure on salaries and expenses of administration in London was £14,963, in Paris £1,304, and in China £13,803, making a total of £30,071. After transferring the amounts of £4,000 and £3,313 to reserve against shares in other companies and debtors respectively, there is left a credit balance of £62,440, which is carried to profit and loss account. To that amount has been added the credit balance of £6,582, being difference in exchange in respect of adjustment of floating assets and liabilities in China, thus bringing it up to £69,022. From this £1,079 has been deducted in respect of depreciation in value of investment, and £25,000 has been transferred to reserve account for redemption of capital expenditure on the collieries, leaving a balance of £42,943, which has been added to the credit balance of £187,885 on profit and loss account at June 30, 1924 making a total of £230,829, which the directors propose should be carried forward to the next account.

The output of coal for the year amounted to 611,397 tons, as against 655,858 tons for the previous year. The sales were 419,925 tons, as against 660,857 tons last year, the decrease being due to the continued shortage of coal wagons, caused by the railways being occupied by the military. These conditions prevailed throughout the whole of the year under review, and very seriously restricted the transport of the coal required for the various dêpots and marts. Under normal conditions the sales would have considerably exceeded those for the previous year, there being an excellent market for the Syndicate's coal.

The consulting mining engineer, in his report for the year under review, states that the development and progress of the works has been as satisfactory as the political condition of affairs in China would permit. It is general knowledge that all operations of a commercial character in the country have been hampered by the military and political disturbances, and the Syndicate has very materially suffered from these in common with all other similar undertakings. Immediately after the date to which the report refers, namely June 30, 1925, the mines were closed down owing to a strike.

Electrical Development in Tokyo

(Continued from page 302).

The general appearance of this plant will be similar in design to the 25,000 kw. machine in the Osaka steam station of the Daido Denrioku, and a similar machine being installed by the Toho Electric Power Company in Kyushu, though it will be somewhat larger in physical dimensions because of the lower frequency at Tokyo. Although this plant will serve for the immediate needs of the Tokyo District it is expected that extensions will be made later, corresponding to the increase in hydraulic station capacity.

A large shipment of high tension electrical equipment providing for 50,000 kilowatts for Tokyo is now being made by the Westinghouse Electric Company. It involves six train-loads of switchgear and 220.000 kv-a. of transformers. Capacity has been provided for two Tokyo substations of 120,000 kilowatts, and these power outlets will later be enlarged to 180,000 kw. Including the new steam power plant which is being built at Senju around 50,000 kw. of Westinghouse turbines the available power for Tokyo will be increased by 230,000 kw.

Denki Fukyukai—A Home Electrification Society in Japan

JAPAN has caught the spirit of co-operation which is playing such an important part in the electrical industry of the United States. In no other industry has there been such progress in co-ordinating for mutual benefit the activities of independent branches. The recognition of this principle in the United States is what is giving such an impetus to its tremendously expanding electrical industry.

That Japan is following suit is indicated by the formation of the Mazda Joseikwai, a manufacturer and dealer organization, and by the Home Electrification Society, Denki Fukyukai, which includes among the persons eligible for membership: "scholars, educators, architects and builders, electrical consumers, persons engaged in general electrical business, power supply companies, persons engaged in electrical work, persons interested in electrification of homes."

Mr. Fagan, who contributed the article on Mazda Joseikwai, above referred to, and who was largely instrumental in the interpretation of the American co-operative idea to the leaders of the industry in Japan, has given us information with regard to Denki Fukyukai.

The object of the society is to bring about the betterment of home life by promoting the use of electricity for homes, and for this purpose the following activities are undertaken: Lectures, training classes, social consultations, and exhibitions; investigations and collection of reference materials; publication of periodicals and other printed matter; the visiting of electrified homes and other places of interest; giving advice for home electrification work.

As reflecting the spirit of the society, we quote as follows from the translation of the pamphlet issued by the society:—

"We believe that modern cultural life must be based on the practical application of modern science and that the possibilities for the betterment of our daily life by the introduction of electricity into homes are beyond our imagination. Looking from the standpoint of safety, health, simplicity and economy, we do not hesitate to declare that the popularization of electrical knowledge get a little spending money from the transportation company. With an easy and smooth acceleration, many of the accidents in the first and third classes can be eliminated, and even in the second class the effect can be minimized, because it is difficult to convince a jury of a quick, sudden, jerky start, when they are accustomed to riding and realize the contrary, and are also informed that it is impossible for the driver to start the vehicle in such a manner.

"I cannot depart from the subject of safety without mentioning one more factor which we consider of major importance, and that is the elimination of gear shifting which has made it possible for the driver when starting up and leaving a corner to give his whole attention to the traffic on the streets without its being diverted in any way. This operation involves the greatest hazard of collisions, and any way by which we can minimize the driver's duties helps toward the prevention of accidents.

"It might be interesting for me to cite at this time a recent accomplishment made by four of our single-deck buses on a trip to Buffalo. The International Railway Company of that city, which is also under Mitten Management, was sorely in need of four buses, and on October 25 these buses left Philadelphia for Buffalo, making the run of 413 miles in 17 hours actual running time, consuming 80 gallons of gasoline, or 5.16 miles per gallon. The whole trip was made in a driving rainstorm. No trouble whatever developed.

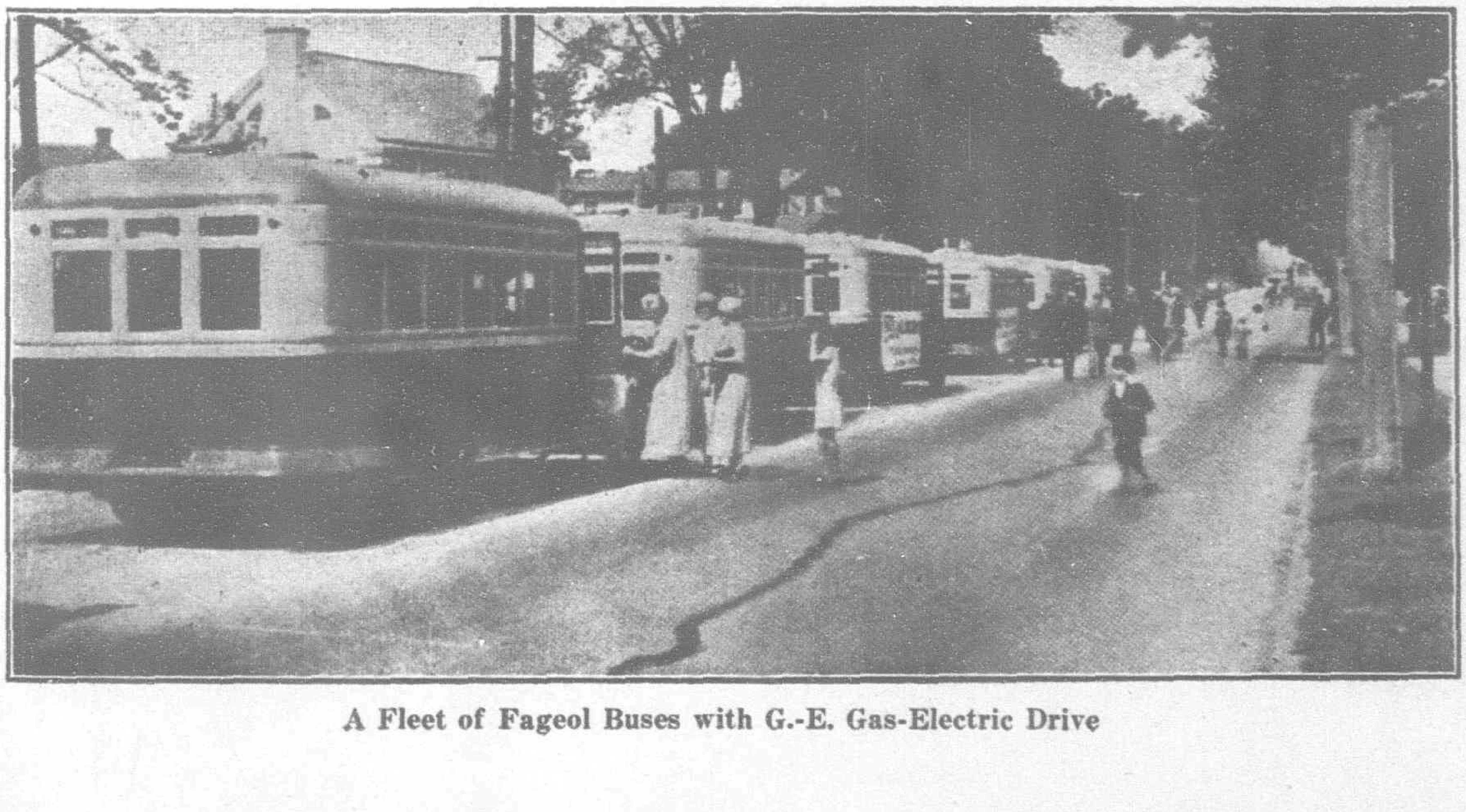
"Despite numerous handicaps incident to initial operation, our gasoline consumption has been satisfactory, October's record showing a maximum of 4.2 miles per gallon for double-deck buses with 60 per cent. of them operating 3.3 miles per gallon or over. The single-deck buses showed a maximum of 7.5 miles per gallon with 80 per cent. operating over 4 miles per gallon. We are loathe to prophesy as to what the gasoline consumption may amount to, but I wish to call your attention to the fact that we have not yet made any attempt to polish up our drivers and to save on gasoline. We are sure, however, that if we have 60 per cent. of our double-deck buses operating 3.3 miles or more per gallon without any effort, we can establish this as a minimum and that our average should run quite a little higher.

"Fundamentally, when we are talking of gasoline consumption we are talking of costs which are about 4½ cents per mile, and when we speak of the advantages of the electric drive we mention first and foremost the high average speed, in which case we are dealing will lead to the highest degree of productive utilization of natural resources.

"In our daily life electricity as light, heat and power, is playing its part as an indispensable necessity, and most recently, in its introduction into homes in the form of wireless broadcasting, as a means of communication and entertainment.

"Since the electrification of our homes is progressing rapidly, it is very important that absolutely safe methods of installation be used, that the scientific methods of handling electricity and the methods of calculating the quantity and price of electricity required for the particular amounts of heat or light needed should be well understood. Otherwise its use will not only lower the efficiency of our life, but also hinder the popularization of this blessing of modern civilization.

"Therefore, in order to promote the electrification of homes, we must obtain the concerted effort of all men and women concerned, including manufacturers of electrical supplies, electrical power suppliers, electrical workers, general electrical consumers, scholars, educators, architects and constructors. We must thus try to exchange our ideas and knowledge for the final attainment of this popularization. Although there are already many institutes and societies which are organized for the benefits of limited circles of electrical specialists, they do not come in close touch with the general



A Fleet of Fageol Buses with G.-E. Gas-Electric Drive public. That is the reason which necessitates the development of this organization.

"In the very first article in the opening volume of our journal, *Electricity for Homes,* Viscount Goto, president of our organization, writes: 'The present economic condition of our country is such that there is a spirit of unrest tending to moral and social degeneration. Moreover, our foreign exchange has fallen to its lowest rate due to the great excess of imports over exports, especially since the earthquake, making the financial outlook exceedingly gloomy.

"'The only way to better our country's condition rests on increased efficiency in every line of activity. Though there are many ways to increase efficiency, there is nothing so important as to cultivate the habits of simplicity and strenuousness and to improve our scientific knowledge applied in industry and in home life so as to strive hard to eliminate waste and economize energy.

"'The tremendous use of electricity in industry, in transportation and in warfare proves that it is an essential medium in preserving the peace and order of the public, and the part it is playing in our daily life was clearly demonstrated when the terrific earthquake in the Tokyo districts threw the whole population into panic for days and weeks after the catastrophe, causing all sorts of ominous rumors, culminating in some dreadful events because the shutting down of the electric light left the whole city in darkness.

"'The fact that the present era is called the electrical era is not to be wondered at. Every man who is born in this era feels that he must have some knowledge of electricity. To meet this wide felt need, we have organized a society for the diffusion of electrical knowledge into homes, and our hope is to make it serve to elevate efficiency in national life by broadcasting the knowledge of the use of electricity far and wide.'"

The attention of the society is further to be given to problems of fuel conservation, the need of increasing national efficiency, the protection of health, and the bringing of relief to those who are hampered by household drudgery.

Quoting again from the pamphlet: "We believe that every home should increase its efficiency by electrification which will lead to the increase of the nation's efficiency, and the increase of the rate of the individual's work."

Mr. Fagan says: "One of the special features of this new society is the inclusion of the housewife and business man as members. As I was in touch with the force leading to the formation of this society and have watched its growth, I am convinced that it has a bright future. With Viscount Goto as president, supported by the vice-presidents and a strong board of directors, the society is sure of success."

Japan's Financial and Economic Affairs

The quarterly report on the financial and economic conditions in Japan, issued recently by the Department of Finance at Tokyo, contains many interesting facts. Referring to the export of gold last September, it states that this is said to have been regarded in foreign markets as a preparation for the lifting of the embargo on the export of gold. That, however, was not the Government's intention, their only motive being to avoid exchange losses in making payments abroad. The Government consider that the balance of trade should be the keynote in bringing about the country's economic revival. With this in view they are encouraging the use of home-produced articles, the increase of shipping routes, the encouragement of emigration, and the development of new markets for export trade. Bills before the Diet at the time the report was prepared provided, among other things, for the abolition of the consumption tax on cotton fabrics and the abolition of the business turnover tax, for which a business profits tax would be substituted. The yield of the consumption tax on textile fabrics in the textile year 1925-26 was 53,672,000 yen, or about £5,200,000 at the present exchange value of the yen, which has lately been a little under 2s.

One of the tables in the report gives particulars of Japan's "invisible exports," which consist chiefly of profits of Japanese undertakings abroad and emigrants' remittances, shipping earnings abroad, and earnings abroad by insurance companies. The total in 1924 was Y.1,192,000,000. Against this sum there were "invisible imports" totalling Y.785,000,000, of which Y.86,000,000 was in insurance payments abroad. On balance, the total of the "invisible exports" was Y.407,000,000 (say £40,600,000), as against Y.384,000,000 in 1923. The exports of cotton goods in 1925 were valued at—yarn Y.123,118,000, an increase of 13,508,000 on 1924, and cotton tissues 432,864,000, an increase of 106,106,000. The imports of raw cotton were valued at Y.923,356,000, an increase of 318,085,000.

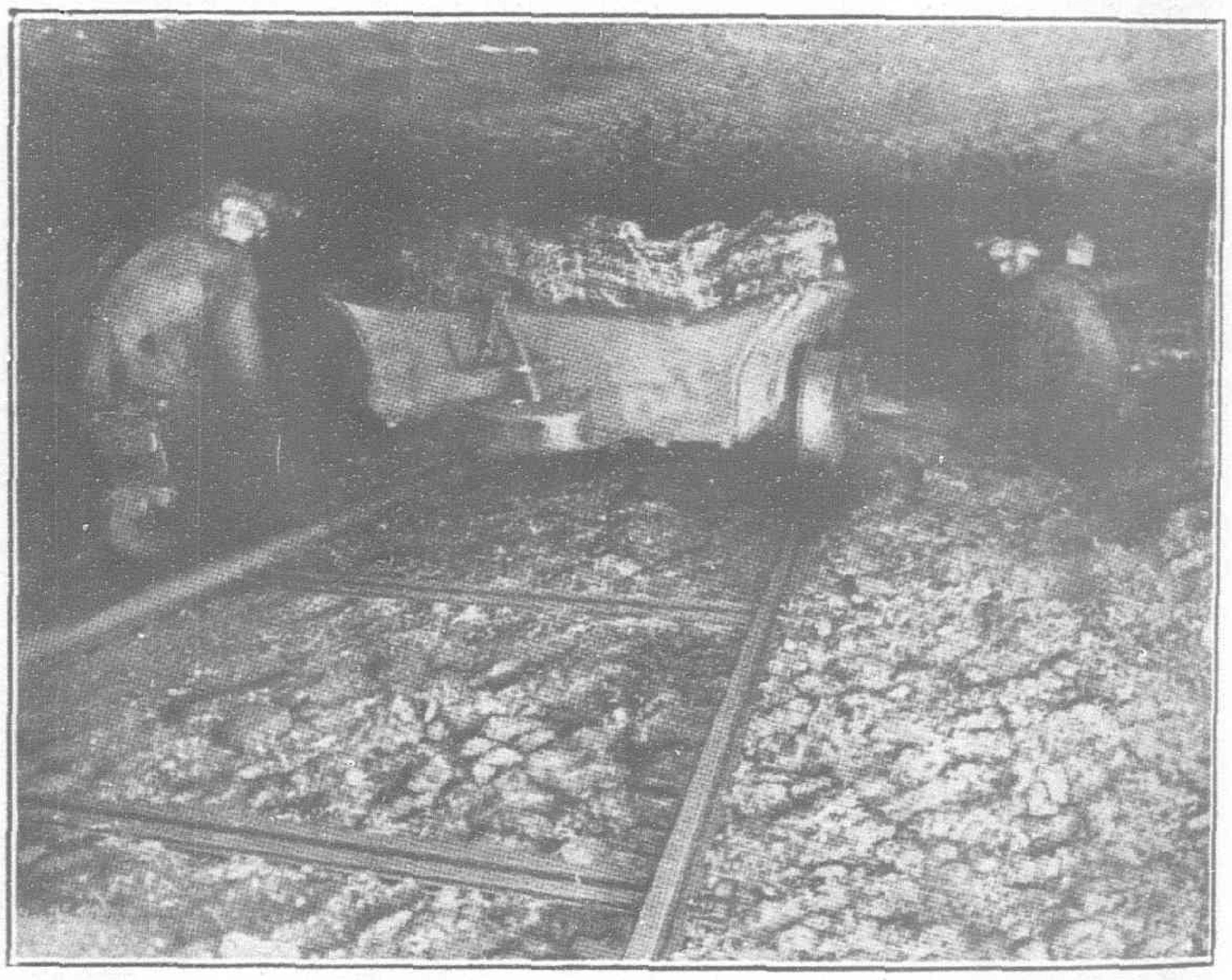
Bethlehem Steel Ties

In an interesting booklet, published by the Bethlehem Steel Company, Bethlehem, Pa., which may be obtained by writing to the Company, appears the following:—

Because of the extensive coal mining operations of the Company, it has been possible for Bethlehem to try out and develop improvements in mine ties under actual working conditions. Three types of steel ties have been developed and are now manufactured, namely: *the Bethlehem Standard Mine Tie, the Bethlehem Universal Mine Tie, and the Bethlehem Steel Tie with Bolted Clips.*

The Bethlehem "Standard" Mine Tie is for use in mines where the rail sections have been largely standardized. It is equipped with two locking clips, giving double holding power. One clip is sufficient to hold the rail, while the other clip can be held in reserve for future use.

The Bethlehem "Universal" Mine Tie is designed for mines where rail sections have not been standardized and several different sizes are in use. The outstanding feature of the Universal Tie is the large drop-forged eccentric clip which holds the rails. This clip has a wedging action, and when turned to position firmly grips the rail.



Showing the Importance of Head-room Gained by the Use of Bethlehem Steel Mine Ties

Steel Ties with "Bolted clips" are used in more or less permanent locations, such as plantations and industrial railroads, where it is not necessary to take the track apart frequently.

Other Uses.—The application of Bethlehem Steel Ties is not limited to mining operations, as the same qualities that recommend them for use in mines are also of marked advantage to all users of light track railroad. Steel Ties are used in laying track in factories, mills, quarries, plantations and in large contracting and road-building operations.

A new development is the use of Steel Mine Ties as gage rods in main haulage ways, laid with wooden ties. Steel ties are usually placed between every third or fourth wooden tie, and not only act as gage rods, but provide a support for the rails as well.

Portable Track in riveted or bolted sections for use in operations where it is necessary to move large sections of track frequently can also be supplied. This track is built of standard rail sections and is equipped with Bethlehem Steel Ties.

American Trade with the Far East for 1925

By J. H. Nunn

ALTHOUGH the United States in 1925 piled up a total merchandise trade with the Far East amounting to $2,135,199,000, an advance of $413,169,000, or 23 per cent. over the previous year, our export trade with these countries was disappointing. Adverse economic conditions, financial stringency, and political disturbances cut deeply into trade in some of the most important countries. Competition was keen everywhere. As a result American exports to the Orient totaled but $667,107,000, an increase of only $2,313,000, or less than one-half of 1 per cent. In sharp contrast, imports increased by $410,856,000, or 43 per cent., to $1,368,092,000, and raised the Orient to leadership as a source of American imports.

Decline in Japan's and China's Share Affects Exports

Japan and China (including Hongkong and Kwantung), the foremost countries in our Oriental trade, with a decline in their shares of 9 and 20 per cent., respectively, were responsible for the reduction in American export trade. United States shipments to Australia, on the other hand, advanced 20 per cent., while New Zealand absorbed 32 per cent. more than the previous year. The Philippines took only 2 per cent. more than in 1924, but India's share rose 9 per cent. Among the lesser countries increases ranged from 32 per cent. in the case of the Netherlands East Indies to 50 per cent. for Ceylon and the Straits Settlements.

The export trade of the United States in 1925 was further enhanced, however, by a total exportation of $107,901,000 worth of gold and $79,794,000 of silver, raising the total exports, visible and invisible, to $854,802,388.

American Imports from Principal Countries Showed Gains

Contrasted with these percentages, during 1925 the United States bought of the Far East over twice as much as it sold and one and one-fifth times as much as in 1924. Imports from each of the principal countries showed substantial gains. Japan sold the most goods to America, but with a gain of only 13 per cent. ranked lowest in relative increase, while the Straits Settlements was second in value of imports, with a sharp rise of 109 per cent. Imports from Ceylon rose 18 per cent., and Australia, showing a 69 per cent. gain, competed with the Netherlands East Indies, which registered 66 per cent. India supplied 40 per cent. more of its products than in 1924, China 30 per cent. more, and the Philippine Islands 15 per cent.

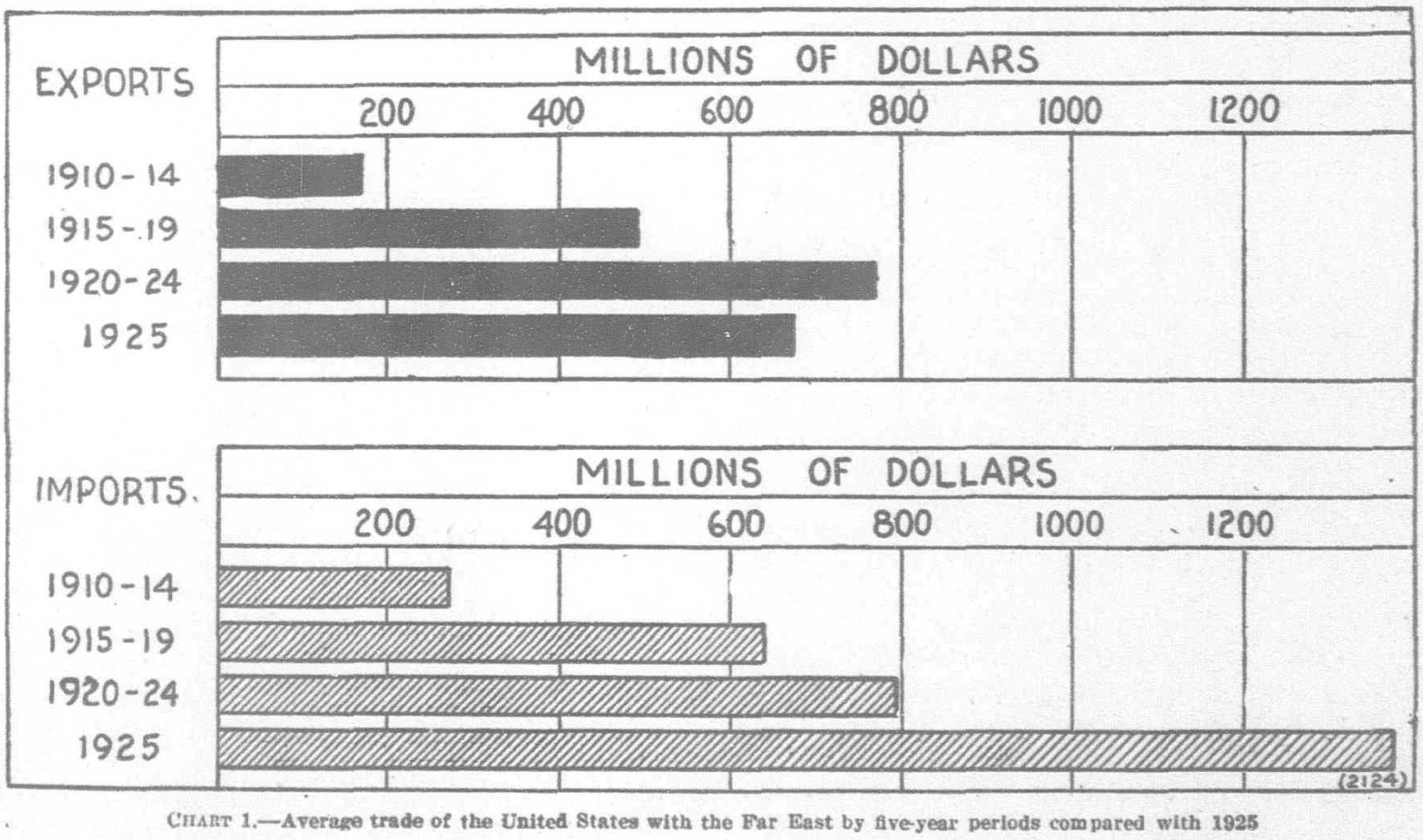


CHART 1.—Average trade of the United States with the Far East by five-year periods compared with 1925

Trade Fluctuation by Five-Year Periods

During 1925 the value of United States exports to the Orient was five times the average value for the 1910-1914 period and more than one and one-half times that of 1915-1919, but dropped 18 per cent. below the average for 1920-1924.

This apparent slump may be accounted for not only by adverse conditions prevailing in Japan and China, which curtailed American sales in 1925, but also by heavy post-war exports, coupled with peak prices in 1920; the heavy requirements for Japan's reconstruction work during 1923 and 1924; and, in some instances, increased purchases for the purpose of avoiding rising tariffs. A sharp decline occurred in 1922, since when the trend has been wholly upward.

In 1910, when trade expansion in the Far East began to be an increasingly important factor in the world markets, the United States bought $225,851,000 worth of Oriental goods, about twice the amount sold in return. With the exception of the war slump in 1915, imports advanced steadily thereafter, reaching the peak of $1,243,717,000 in 1920. Fluctuations followed, but in 1925 the United States was importing more than five times the average for 1910-1914, more than twice that of 1915-1919, and 60 per cent. in excess of the 1920-1924 period.

Principal Imports and Exports Compared

Seven commodities constituted practically 73.5 per cent. of the total value of United States' exports to the Far East during 1924 and 1925, while nine items made up 75 and 71 per cent., respectively, of the imports for the same years.

Approximately 34 per cent. of these principal exports consisted of raw products and the balance manufactured goods. In contrast, 79 per cent. of the nine leading imports consisted of raw materials, 15 per cent. of finished products, and 6 per cent. of foodstuffs. Raw cotton and automotive products alone registered increases. The decline in the remaining five commodities reflected the adverse conditions already discussed.

Preliminary figures show that during 1925 the Orient furnished an outlet for 539,345,000 pounds of American raw cotton, worth in round numbers $128,000,000, or 12.3 per cent. of the entire amount of our cotton exports. It also consumed $91,000,000 worth of petroleum products, including 693,000,000 gallons of refined mineral oils, or 20 per cent. of the exports; $46,000,000 worth of tobacco, cigars and cigarettes, and 81,350 American automobiles, or 26 per cent. of the entire number sold in foreign markets.

Direct imports of raw silk from the Far East achieve the record-breaking total of 60,026,000 pounds, or 93 per cent. of the foreign silk absorbed by the United States. These countries also supplied 736,145,000 pounds of crude rubber, or 83 per cent. of the total purchased abroad; 27 per cent. of the value of hides and skins; and 985,549,000 pounds of sugar, or 19 per cent. of the amount imported.

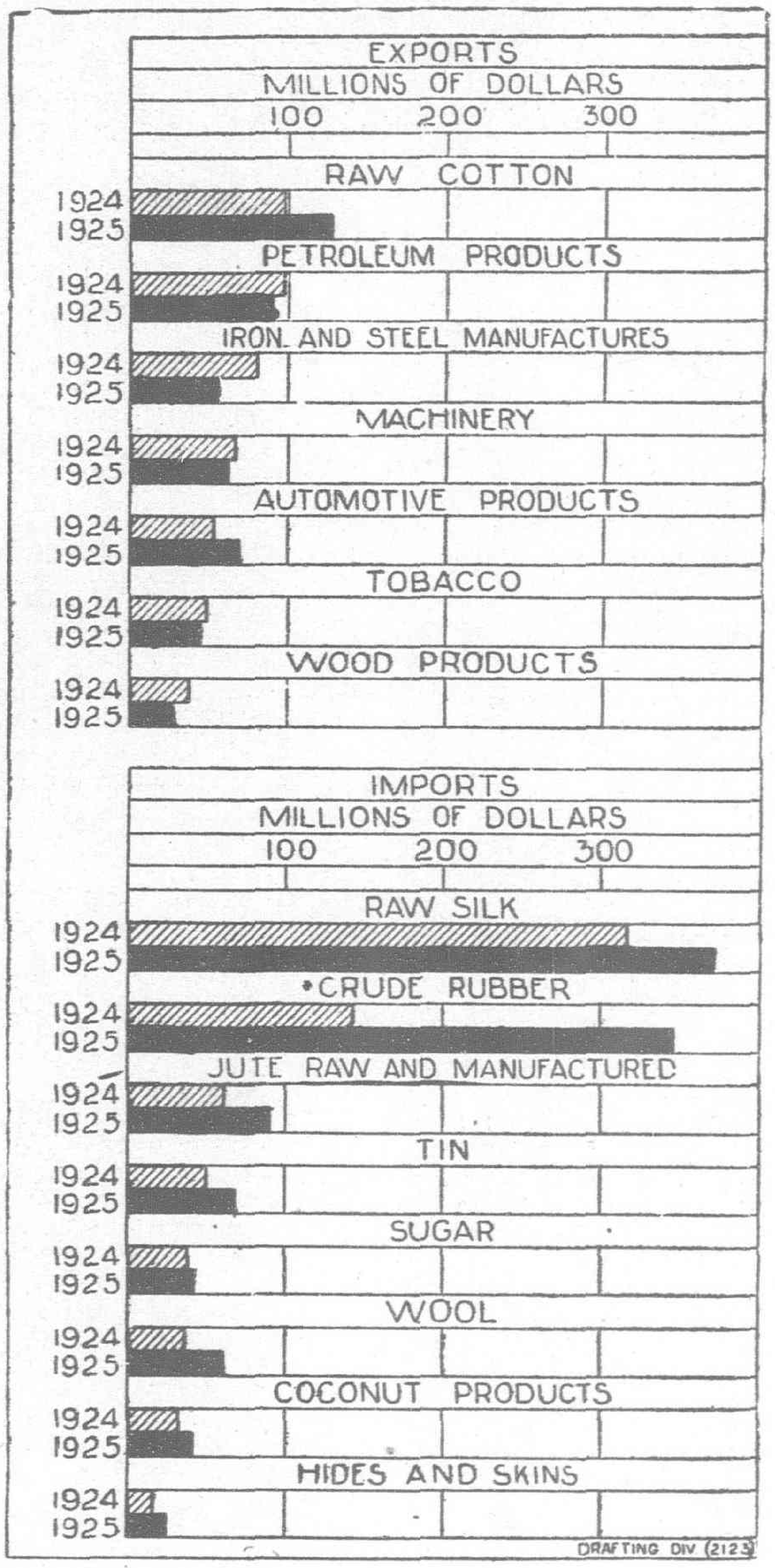


CHART 2.—United States trade with the Far East by principal commodities

Japan and China Lead Asiatic Trade

Japan with an aggregate trade with the United States of $611,819,000, a gain of $21,513,000, or 3.6 per cent., ranked first both as a consumer of American goods and as a source of supply for Oriental products. This increase, however, was the result of heavier imports. Fluctuation of the yen and practical completion of temporary construction in Japan tended to reduce our exports there during 1925 by $22,599,000, or 9 per cent. from $250,306,000 to $227,707,000. In contrast, heavier purchases of Japanese commodities, especially raw silk, advanced imports by $44,051,000, or 13 per cent., from $340,061,000 to $384,112,000.

Although China's combined exports and imports, which aggregated $304,036,000 (including Hongkong's share of $32,095,000 and Kwangtung's of $8,794,000)—a gain of $31,937,000, or 12 per cent.—gave that country third place in total trade, it ranked second among exports in the Asiatic group. China maintained the lead in world markets for American kerosene and outranked other countries of the Orient in the consumption of leaf tobacco and cigarettes. These gains in exports to China, however, were counterbalanced by heavy decreases. Trying political and economic conditions, tending to trade disruption there, reduced United States' sales by $22,169,000, from $135,279,000 to $113,110,000. Exports to Hongkong totaled $14,306,000 and to Kwantung $5,267,000. Imports from China, on the other hand, advanced $54,085,000, from $136,820,000 to $190,906,000. The bulk of this increase was not confined to any single commodity. There was a general advance in all Chinese staples required by America's increased industrial activity.

Philippine Exports Decline, but Imports Register Gain

The United States trade with the Philippines was weak on the export side, but showed substantial gains in imports. The demand for hemp and coconut products accounted for the 15 per cent. increase in imports, which rose from $97,088,000 to $111,838,000. Exports of cotton manufactures advanced, but a decline in other staples reduced our exports from $59,519,000 to $61,062,000, a gain of only $1,543,000, or 2 per cent.

East Indian and Malaysian Trade Improved

Commercial transactions with the East Indies and Malaysia showed interesting features. Despite the disturbed economic conditions which have prevailed in India for several years, both imports and exports advanced, piling up a total trade of $183,160,000, an increase of $54,589,000, or 52 per cent. Larger sales of automobiles, machinery, and iron and steel raised exports 9 per cent., to $38,282,000. Four commodities—raw and manufactured jute, goatskins, and shellac—accounted for approximately 75 per cent. of our total imports from India, which in 1925 attained a value of $144,484,000, a gain of 40 per cent.

Straits Settlements, Netherlands East Indies, Ceylon, Siam, and Indo-China afford a growing market for American steel mill products, machinery, and automobiles, mineral oils, tobacco products, and canned goods. Although the combined sales to these countries are relatively small, last year amounting to only $35,626,000, or 5.4 per cent. of the total American exports to the Orient, they represent an actual increase of 40 per cent. over the total 1924 value. The increasing importance of these countries in our trade is further evidenced by the fact that Straits Settlements, Netherlands East Indies, and Ceylon are the chief sources of supply in the Far East for rubber, tin, coffee, tea, and spices. Combined imports from these three countries in 1925 aggregated $457,928,000, approximately twice the amount of the preceding year, and representing nearly one-third of our entire imports from the Orient.

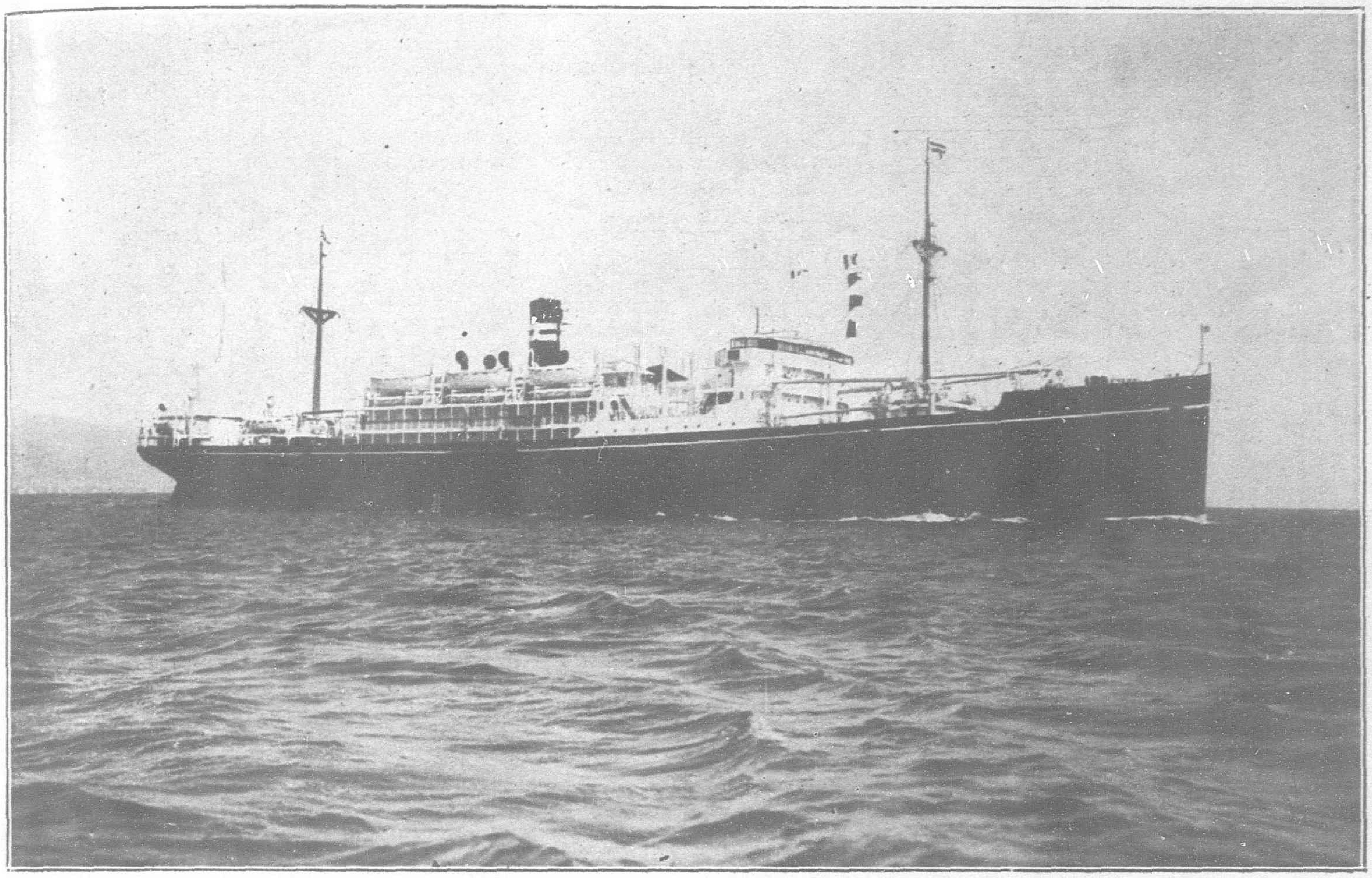
Straits Settlements, only eighth in the export trade, captured second place in the total trade with $325,162,000 to its credit, an advance of $170,033,000, or 109 per cent. It ranked first in relative increase of total trade and second in imports—a position gained, however, through the excessive value of its rubber and tin. Imports from the Netherlands East Indies amounted to $95,828,000, a gain of $38,308,000, against exports totaling $19,204,000, an advance of $4,725,000. Ceylon's share in the United States import trade reached $48,159,000, more than twice that of 1924, while American exports to Ceylon totaled only $2,386,000.

Larger Export to Australasia

Australasia's general prosperity, combined with a preference for certain American products and the demand in the United States for wool, furs, hides, and skins, increased the total trade of the entire Oceanic group by $61,845,000, or 30 per cent., to $267,297,000. Exports to Australia mounted 20 per cent., from $125,178,000 to $148,529,000, ranking it second in the total export trade with the Far East, and first in the markets for American automobiles. In return, the United States bought $55,110,000 worth of Australian products against $32,868,000 the previous year. Exports to New Zealand reached $38,363,000, an advance of 32 per cent. from $29,306,000 in 1924, while imports, totaling $19,734,000, showed a gain of 46 per cent., from $13,525,000.

Balance of Trade Readjusted

The Far East's trade balance with the United States amounted to $292,442,000 in 1924. By the close of 1925 this had risen to $670,985,000, or $3,878,000 in excess of the total exports to the Orient. In the readjustments following the year's trade American sales to Australia and New Zealand more than counterbalanced increased purchases of Australasian wool, furs, and skins, raising the trade balance favourable to the United States in these countries from $108,091,000 in 1924 to $112,053,000 in 1925. Credit balances were also maintained in Siam and Indo-China. Each of the other countries, however, increased its balance unfavourable to the United States in amounts varying from $12,767,000, or 13 per cent., with the Philippines, to $162,592,000, or 116 per cent., on the part of the Straits Settlements.



O.S.K. Line "Santos Maru," Gross, 7,300 Tons; Displacement 13,000 Tons

The Largest Japanese Motor Liner

The 14-knot Sulzer-engined "Santos Maru." One of Three Vessels for a Round-the-World Service.

AT the end of 1924 the Osaka Shosen Kaisha, Ltd. (O.S.K. Line) placed an order for three motor liners to maintain their round-the-world service westward, via ports in the Far East, India, Africa, South America, and the United States through the Panama Canal.

These vessels represent the largest motor ships built in Japan, and the first, the *Santos Maru,* is now engaged on her maiden voyage. She will be followed shortly by the sister ships *La Plata Maru* and *Montevideo Maru,* all specially designed and built by the Mitsubishi Zosen Kaisha at their Nagasaki yard. The three liners are similar in all respects, but whilst the machinery for two of them has been manufactured by Sulzers at Winterthur, the engines for the third are being constructed under licence at the engine works of the Mitsubishi Zosen Kaisha, Ltd.

The keel of the *Santos Maru* was laid on January 5, 1925, and trials were completed in December of the same year, whilst a commencement of the maiden voyage from Kobe was made on December 24.

The following are the leading particulars of the *Santos Maru* :—

Length overall	449-ft.
Length b.p.	430-ft.
Breadth, moulded	56-ft.
Depth, moulded to awning deck	36-ft.
Draught, loaded	25-ft.
Deadweight capacity	7,200 tons
Gross register	7,300 tons
Speed in service	14 knots

Complement :—

First-class passengers	40
Third-class cabin	110
Emigrants	600
Officers and crew	110
Total	860

The *Santos Maru* is classed at Lloyd's 100A1 " with freeboard " L.M.C. The double bottom extends fore and aft and fuel oil can be stowed in all the tanks. There is also a series of deep tanks on each side of the shaft tunnels in the after holds and a deep fresh-water tank on each side of the thrust recess of the engine. Seven transverse watertight bulkheads, continued to the awning deck, divide the ship into eight compartments.

The engine-room is somewhat aft of amidships, with three cargo holds forward and two aft. The holds and 'tween decks have a total cargo capacity of about 360,000 cubic ft., including 10,000 cubic ft. for refrigerated cargo and 17,000 cubic ft. for silk. Below the awning deck are two continuous decks—the upper and the second deck.

Deck Machinery

The vessel is of advanced design so far as auxiliaries are concerned, since all deck machinery is electrically operated. A Clarke-Chapman windlass is fitted and the 12 Laurence-Scott winches are of the electric type, operating 12 derricks—eight with a capacity of two tons, two of six tons and two of 10 tons. Brown Bros. electro-hydraulic steering gear is fitted and there are two electrically operated refrigerating plants of the Mitsubishi multiple-effect CO_2 type.

Main Engines

The two Sulzer engines are each designed to develop 2,300 b.h.p. at 110 r.p.m., having six cylinders 600 mm. bore and a piston stroke of 1,060 mm. These are standard in every respect, the scavenging air being supplied from two electrically driven turbo blowers, each running at a speed of 2,500 r.p.m. and delivering at a pressure of 1.1 atmospheres absolute (about 1.4 lb. per sq. in.).

There are two air compressors on each engine, driven from the crankshaft and set at 180 degrees to each other. The h.p., i.p. and l.p. cylinder diameters are 150 mm., 510 mm. and 560 mm. respectively, with a piston stroke of 350 mm. This unit is capable of supplying sufficient air to run both engines at threequarter load, the necessary cross connections being provided.

The Compressed Air Supply

The injection-air compressors on the main engines are designed to provide the air needed in running at full power, with an ample surplus for charging the storage-air reservoirs. When a very large number of manœuvres have to be carried out, one of the two auxiliary compressors is brought into operation. These work at a pressure of 70 atmospheres (1,000-lb. per sq. in.) and are of the three-stage type running at 400 r.p.m., driven by 140 h.p. Brown-Boveri motors. The diameters of the h.p., l.p. and i.p. cylinders are 65 mm., 290 mm. and 325 mm. respectively, the piston stroke being 180 r.p.m. There is also an emergency air compressor and lighting set driven by a hot-bulb engine of 6 b.h.p., but this is only needed in case of a complete loss of air on the ship.

Ten 800-litre high-pressure air-storage reservoirs are fitted, the pressure being 70 atmospheres, and these are utilized for charging two storage-air reservoirs of 5 cubic metres capacity through reducing valves, the pressure in the low-pressure bottles being 30 atmospheres. Starting air for the generator engines, as well as the main engines, is supplied from these reservoirs. Each main engine has one injection-air bottle of 150 litres capacity on the engine itself, but two of the high-pressure air-storage reservoirs can be isolated from the others and retained for the purpose of supplying injection air if needed.

The two turbo scavenging blowers are of the Brown-Boveri type, each with a capacity of 660 cubic metres per hour. They are arranged in a separate compartment at the end of the engine-room on the port and starboard sides respectively. The air is drawn in through an opening at the forward end of the main funnel on the boat deck, the intake trunk and the blower compartment being lined with Mascolite to prevent noise. It was found on trials that this was very effective. Each of the motors driving a blower is of 175 kw. rating.

Three 150 kw. and one 37.5 kw. generators are installed, operating at 225 volts. All the engines driving these are of the new airless-injection Sulzer type. The larger units have four cylinders, 310 mm. bore and 420 mm. stroke, the speed being 300 r.p.m. The 37.5 kw. generator is driven by a two-cylinder engine running at 350 r.p.m. Whereas crank-chamber compression is used in this engine, separate piston pumps are employed with the larger unit.

There is one boiler used for heating and galley purposes. It is of the Cochran type, with a diameter of 5-ft. 6-ins. and a height of 13-ft. 6-ins., the total heating surface being 300 sq. ft., the evaporation per hour 2,160-lb., and the working pressure 100-lb. per sq. in.

With a light ship and the engines developing 4,689 b.h.p., a speed on the measured mile of 16.41 knots was attained. On the trials the fuel consumption for the main engines worked out at 178 grammes per b.h.p.-hour at full output and 171 grammes at 3,419 b.h.p., corresponding to .39 and .38-lb. per b.h.p. hour respectively.

First Class Social Hall in Japanese Fashion

New Far Eastern Contracts Placed in Britain

Water Purification Plant

A water purification plant having a capacity of 6,500 gallons per hour is to be supplied to Kuala Lipis, in the Federated Malay States, by Bell Brothers, Ltd., Manchester.

Shipbuilding at Barrow

There is increased activity in the shipbuilding trade at Barrow. Work has been commenced on a 20,000-ton liner for the Orient line for service between London and Australia, on a passenger steamer for the Singapore and Penang trade, and on a vessel for the Donaldson line.

Rails and Fishplates

Dorman Long and Bolckow Vaughan are to supply a heavy tonnage of rails and fishplates to the Madras and Southern Mahratta Railway.

Telephone History in China*

Passes Quarter Century Mark and Progressing Steadily

By P. N. Chung, Chief of Electrical Department, Ministry of Communications

THE telephone service in this country made its appearance in Peking and Tientsin. It was in the year 1900, when the Allied Army got into Peking at the time of the Boxer uprising, that a Dutch subject named Pulson started the Electric Bell Company in Peking, Tientsin and Tangku. The plants were quite small. There were not more than 200 subscribers in all. In 1906, the Chinese Government bought over those exchanges from the Company. This was the first time that the Chinese Government undertook to run the telephone enterprise which was intended to be made a government monopoly. Later, Government telephone plants were founded at Nanking, Shanghai, Soochow, Hankow, and many other cities, the scope of which up to 1924 is as follows :—

Number of Exchanges		22
Number of telephone subscribers		39,035
Miles of Wire :	Local	94,260
	Long distance	9,465
Average number of conversations, daily		546,495
Total investment in telephone plants		$18,000,000
Gross Telephone Revenue, year 1924		$3,200,000

Behind Demand

The government, on account of its financial condition has not been able to build as many telephone plants as the public requires. Consequently, there are still many exchanges owned by private companies, and some others by provincial governments or municipal corporations.

At present there are 35 private telephone companies according to the information from the Registry Section of the Ministry of Communications. As provincial and municipal exchanges have not been registered, no statistics can be given.

The history and present conditions of some of the large government exchanges may be stated as follows :—

Peking: The Peking telephone plant is the largest in this country. Its history has been given in the first paragraph. There are 4 sub-offices in the city. The total capacity of these 4 offices amounts to 16,200 numbers. In addition it has established a number of small exchanges in Tungshian, Nanyuan, Peiyuan, Hsiyuan, Shiangshan and Tangshan. All of these places are connected with Peking through toll lines.

Tientsin : This plant has the same history as that of Peking. It has 2 sub-offices in the city and another in Tangku. The local sub-offices have a total capacity of 8,200 numbers. This being still inadequate to the public demand, steps have been taken by the government towards enlargement. A capacity of 9,000 numbers of automatic system will soon be installed. When this is done it will mark a new era in the history of the Chinese Government telephone service.

Hankow, Wuchang and Hanyang : The telephone service in these three cities was started by the respective municipal offices and afterwards shifted to a certain private company. In 1912 the whole plant was sold to the Ministry of Communications. At that time, there were only 3,000 subscribers. But, since then, development and reforms have been made from time to time, and the Hankow and Wuchang exchanges are now among the largest in China.

Shanghai : In the Foreign Settlements of Shanghai, the telephone service is under the management of an international management of an international corporation known as the Shanghai Mutual Telephone Company. Through the demands of the inhabitants in the Chinese city, the service of the Company had penetrated to points outside the settlements before the Government established the Shanghai Telephone Administration at Nantao in 1907. This was done in view of the importance of the service and as a step to protect the government's own jurisdiction. Shortly after, a sub-office at Chapei was erected, and in 1917 the telephone service at Nanshiang was started. The latest record shows that there are 700 subscribers in Shanghai. After the coming into force of the inter-communication agreement recently signed between the Government Administration and the Mutual Company on the one hand, the opening of the Shanghai-Nanking long distance telephone service on the other hand, however, the Shanghai plant is hoped to be greatly developed in the near future.

Nanking and Soochow : The telephone plants in these two cities were started by the Ministry of Agriculture and Commerce in the Tsin Dynasty. After the Revolution in 1911, their management was transferred to the Kiangsu Provincial Government. In the following year, it was suggested to have them leased to some private company. But the service was made a government monopoly, and eventually sold to the Ministry in 1912. At present the Nanking exchange has 3 sub-offices and a capacity of 2,800 numbers, while that of Soochow is 2,000.

Besides the cities described above, there are many others in which the Ministry of Communications has established Telephone plants. They are too small to be described here.

Toll Lines : All the toll lines in this country are possessed by the Government. Among them, the Peking-Tientsin line has the longest history. During the past few years, the Shanghai-Nanking, Tsinan-Tsingtao, Tientsin-Mukden and Peking-Suiyuan lines have been put into operation one after the other. They are briefly described as follows :—

Chinese Girl Operators in Nantao Telephone Exchange, Shanghai

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*Oriental Engineer.

The First Line

1. Peking-Tientsin—At the time of the Boxer Uprising in 1900, the Peking-Tientsin toll line was erected by Mr. Pulson. This was sold to the Government together with the Peking and the Tientsin Exchanges in 1906. At present there are nine circuits. This line is becoming the busiest one in this country.

2. Tsinan-Tsingtao—This line was erected by the Japanese along the railway when Tsingtao was seized by Japan. After it was restored to China, the telephone companies in Tsinan and Tsingtao offered to operate the long distance line. The proposition was rejected by the government, and through long negotiations an agreement was reached between the Ministry and the telephone companies concerned. Thus the service was put into operation again on April 1, 1925.

3. Tientsin-Mukden—The construction of the long distance telephone line between these two cities was commenced at the end of 1922. The wire is suspended on the telegraph posts. Three circuits have been completed and put into operation since April 15, 1925.

4. Peking-Suiyuan—The whole line is still under construction. The completed section from Peking to Kalgan is now entirely used for Military purposes.

5. Shanghai-Nanking—The work of this line was started in the year 1915. But, being interrupted, only the Shanghai-Wusih section has been completed up to the present. If the service is successful it will be extended to Nanking. The finished section of the line is ready to be put into use as soon as the agreement between the Ministry and the Wusih Telephone Company is signed.

Instruments and Charges. Most of the telephone instruments are of foreign make. The Ministry adopts the magneto system for small places and common battery system for larger cities. Tientsin is the only place to use the automatic system, which is to be installed before long.

Irrigation in Southern India

Projects in Madras and Mysore

THE Triennial Review of Irrigation in India, shows the wide scope of development in the Southern Presidency.

The Madras Presidency stands second only to the Punjab in the vastness of the area of cultivation brought within the scope of irrigation work in British India. The Northern Province has some ten and a half million acres of land under irrigation each year, and the Southern Province about seven and a quarter millions, while the remaining provinces all told have something less than ten million acres. Yet while the area irrigated in the Punjab represents 38.2 of cultivation, in Madras the proportion is less than 19 per cent.

During the period 1921-24 some exceedingly important works were completed, and very substantial undertakings were in course of progress in all the three great deltas of the Presidency. In the Godavari delta improvements were being made in the upper portions of the Yenamadurru drain, and the Kovvur-Manjair Junction Canal was being restored, the combined cost exceeeding Rs. 11 lakhs. In the Kistna delta the 3 feet shutters of the anient at Bezwada were being replaced by shutters 6 feet high, and diversions were being made in the Nallamada drain, the total estimated cost being Rs. 11¼ lakhs. In the Cauvery delta the Thoppadanavali dam was being reconstructed, and improvements were being made to the lower reaches of the Cauvery from the infall of the Ayyavayyanar to the sea, these works costing Rs. 3¾ lakhs.

These works are, however, of minor consequence in comparison with the Cauvery reservoir project, the way for which was opened up by the agreement reached in February, 1924, with the Mysore State defining, after protracted negotiations, the respective rights of the two Governments to the waters of the Cauvery. The estimate of the project, revised in accordance with the current schedule of rates, amounts to Rs. 612 lakhs (£4,590,000). This scheme, which has received the sanction of the Secretary of State and is being taken in hand, will improve the existing fluctuating water supplies for the Cauvery delta irrigation of over 1,000,000 acres, and will extend irrigation to a new area of 301,000 acres. It is calculated that in this way 150,000 tons of rice will be added to the food supply of the country. The project is expected to yield a net revenue of Rs. 47 lakhs, or 7.6 per cent on the estimated capital cost.

During 1924-5 some Rs. 14 lakhs were spent on the Krishnarajasagara dam. The low gaps in the dam were filled, and the raising of the low portions to 122 feet is now under progress. During the floods of July this year the water was stored to 106 feet, and passed over the 106 feet weir to a depth of about 1¾ feet. The current year's programme is to raise the masonry to 122 feet throughout the whole length of the dam and then to arrange for raising it to 130 feet, the final contemplated level, in accordance with the recommendations of the Committee appointed in March last, with Sir Frederic St. John Gebbie, Consulting Engineer to the Government of India, as chairman. The total expenditure of the Mysore State up to the end of 1924 on the dam works and canals has been Rs. 28 lakhs. As a result of the unprecedented floods of 1924 almost all the anients and channels in the Cauvery valley sustained serious damage, and immediate arrangements were made to restore by temporary sand-bag dams the water supply in all the channels which were seriously affected. An expenditure of Rs. 2¼ lakhs was incurred on the flood damage works, which were carried out before the current irrigation season.

In the Southern Presidency, Lord Goschen's Government have undertaken a general re-examination of the possibilities of irrigational extension. Proposals which had been in abeyance for one reason or another have been re-examined, and further projects have been mooted. In particular the possibilities of extension in the scarcity and famine areas of what are known as the Ceded districts have been under consideration. The Tungabhadra reservoir project, as originally proposed, has been found to be financially impossible but a modified form of the project is being examined. The scheme contemplates the construction of an anicut and channel from the Tungabhadra to irrigate about 80,000 acres in the Bellary district. Projects for an extension of the Basavannah channel in the same district, for the construction of the Thipayapalem tank in the Kurnul district, and for the improvement of the Vadavar in the South Arcot district have been sanctioned.

For the Coimbatore district the lower Bhavani project for a storage reservoir on the river has been recast and revised. It provides for the irrigation of 110,000 acres at a cost of Rs. 225 lakhs. An alternative project for a reservoir at a higher site is, however, being examined before a final decision is made. A project designed to irrigate an area of very fertile soil in the Polavaram Island in the Godavari delta by means of extension of the Godavari canal system, at a cost of Rs. 18½ lakhs, has also been prepared.

The Vengalapuram project in the Nellore district contemplates the irrigation of some 50,000 acres and is estimated to cost about Rs. 40 lakhs. Proposals for a storage project on the Krishna River were revived and preliminary investigations of the dam site started, but these had to be discontinued pending negotiations with the Hyderabad Durbar. The project is for a reservoir at Sangameswaram to store 125,200,000,000 cubic feet, at a cost of Rs. 2,533 lakhs (nearly £19,000,000), for the irrigation of no less than 1,750,000 acres in the Kistna, Guntur, Nellore Kurnool, and Chingleput districts.

Greater Shanghai

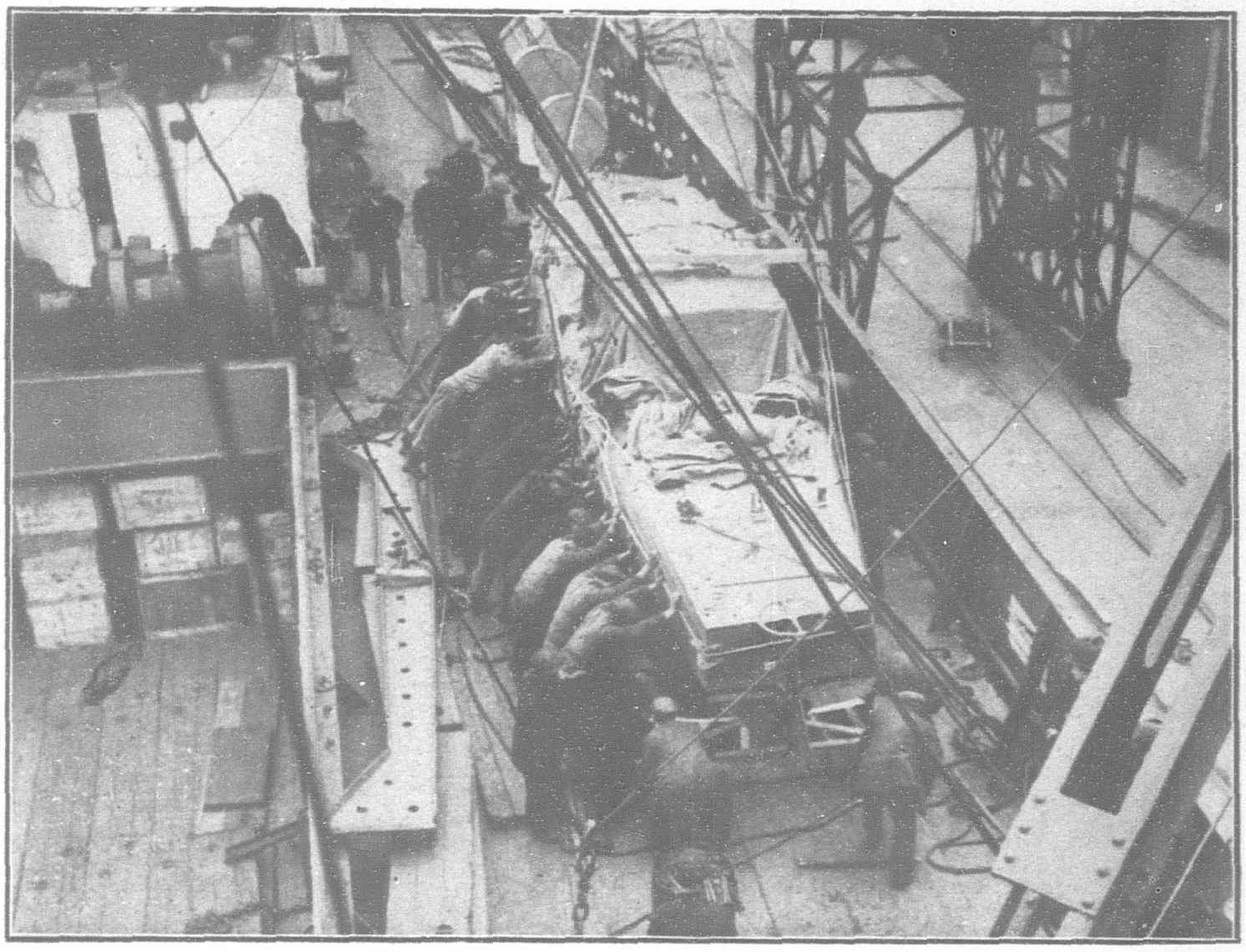
(Continued from page 301).

present total taxation, great improvements can be effected in Shanghai. Abolish all unnecessary, unqualified or dishonest officers without trying to save their faces, plan the work and finance properly, enforce regulations relentlessly, and the town will be transformed as if by magic. This is a hard saying, but a true one. We have said little about sanitation, water supply, lighting, etc. As to the first, we do not hesitate to say that the Chinese areas are filthy to an extent that would horrify an officer of public health in Europe and America. This is the result of poverty, ignorance and lack of police control, and can only be cured slowly by propaganda and severe police methods which will be much resented. Water and light can probably best be supplied in the Chinese city by private companies, whose franchise shall compel them to maintain certain standards of efficiency under heavy fines for failure, and with publicly controlled tariff schedules.

35-Ft. Hydroplane for Service in Japan

AN interesting type of hydroplane was recently despatched to the order of the Japanese War Department by whom the boat is required as a high-speed cruising vessel for inspection work.

The exact nature of the service for which she will be employed is not disclosed, but that the boat is likely to be actively engaged at times is apparent from the provision of detachable bullet-proof plates over the more vital portions of the hull, such as the situation of the fuel tank, steerman's position, etc.

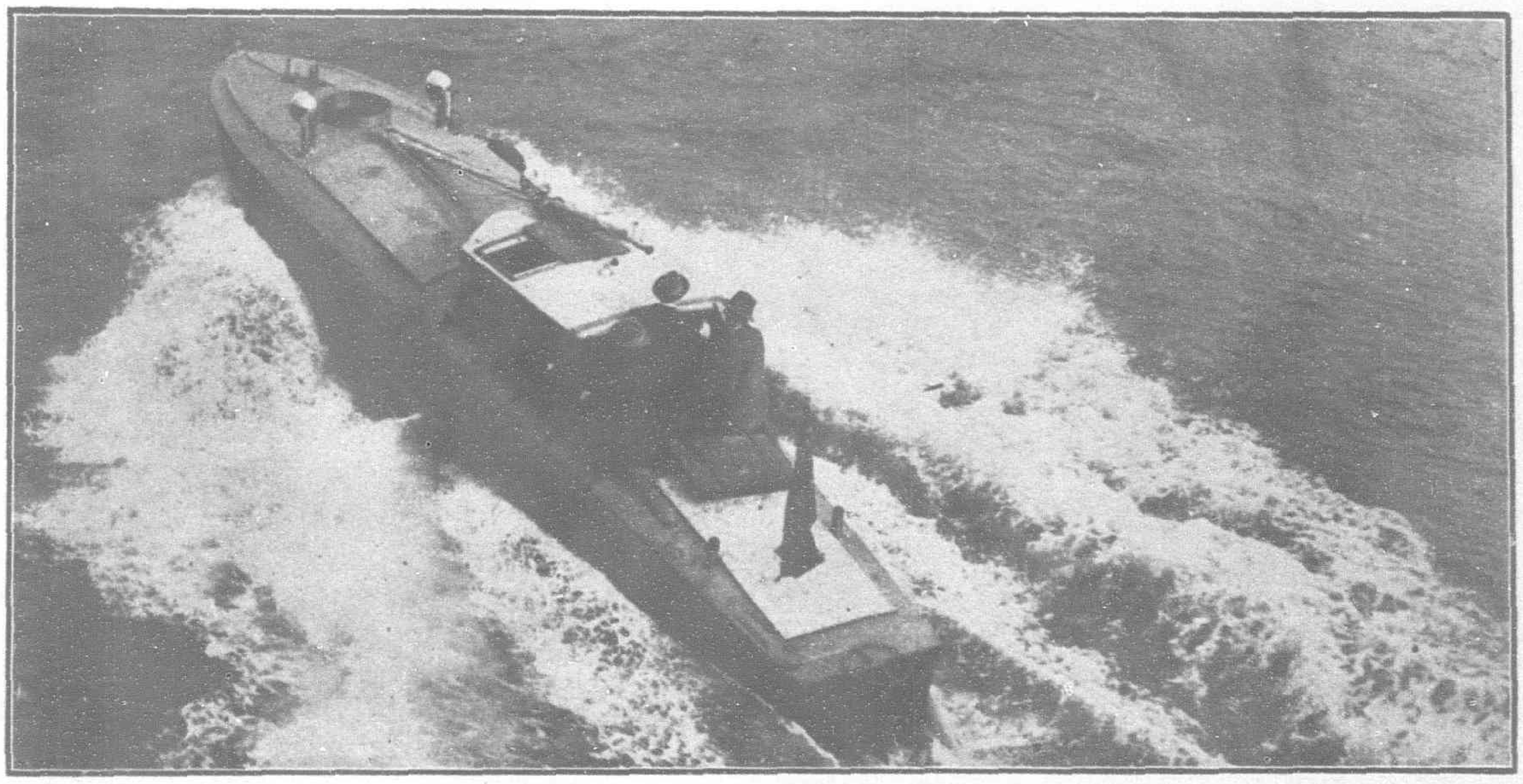


Shipping the Hydroplane to Japan

Motor Boat, describing the hydroplane, gives the following details :

Having an overall length of 35-ft. and a beam of 8-ft., the vessel appears closely to resemble a small C.M.B., although in regard to general arrangements she differs considerably. The hull is built of double-skin mahogany placed diagonally with oiled linen between each skin, and not only is it absolutely watertight, but relatively light, and a certain degree of necessary flexibility is allowed. The craft is copper-fastened, the general construction being along the lines of the Thornycroft patent skimmer system this provides for a third skin at the forward part of the boat, and arranged to form the step, which to all intents and purposes is an independent part of the hull. The machinery is installed slightly forward of amidships and consists of a twelve-cylinder Thornycroft petrol engine of 250-b.h.p., having a designed speed of 1,400 r.p.m.

The drive is taken through a clutch and reverse gear to a special spiral propeller, the shaft being supported in a bearing forming a part of the rudder bracket, whilst a small secondary tail shaft bracket is arranged beneath the hull, at a distance of about 3-ft. aft of the point where the propeller shaft pierces the skin of the boat.



The 35 Ft. Thornycroft Hydroplane

A Spiral Propeller

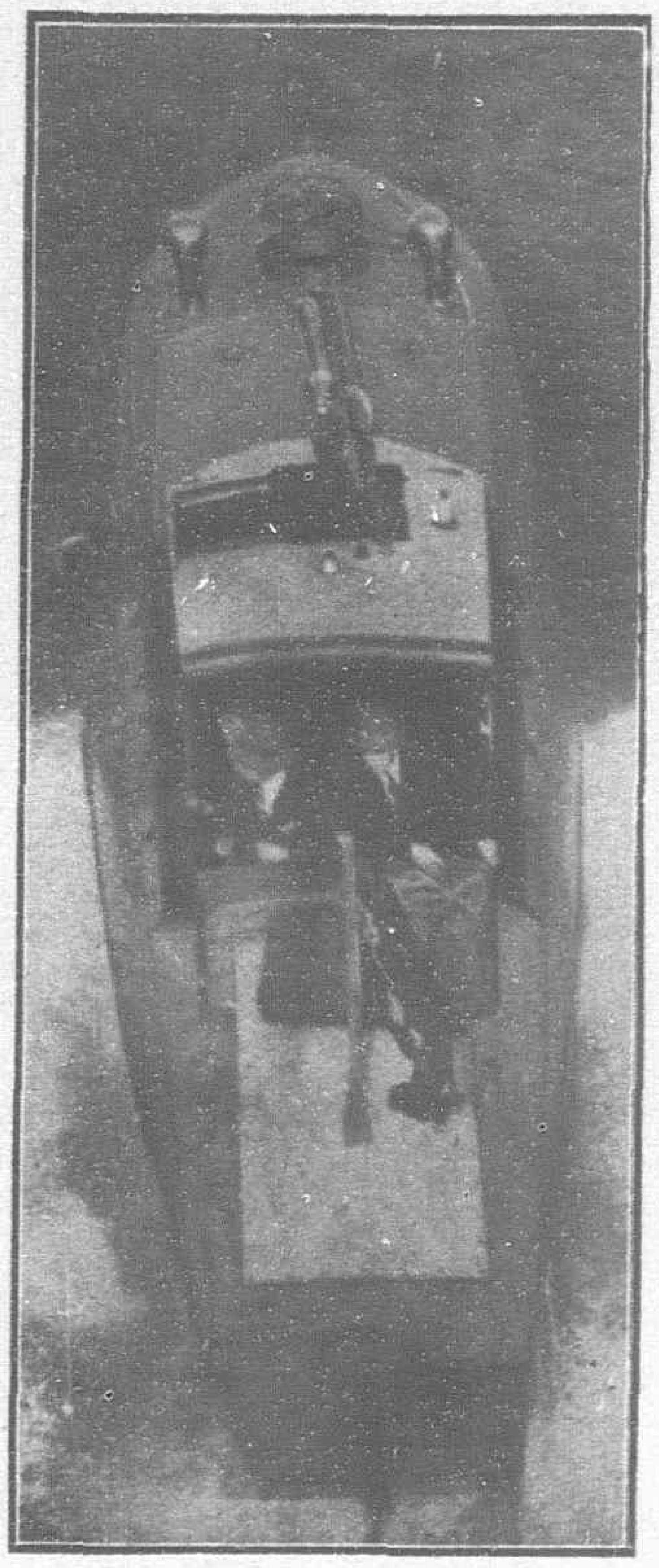
Reverting to the spiral propeller, it will be recollected by many of our readers that this screw was a development which came considerably to the fore during the war in connection with C.M.B.'s. Not only is the efficiency of the spiral propeller practically equal to that of a bladed screw, but it is far less liable to damage should the boat come in contact with rope, wire, seaweed or other obstruction.

Fuel to the extent of 115 gallons is carried within the after part of the boat, the tank being removable through a large hatchway in the covering deck. Thus the fuel carried permits of a radius of action of 200 miles. It was stipulated that the boat should be seaworthy at high speed, and undoubtedly this is one of the chief characteristics of the Thornycroft type of hydroplane. Our experience goes to prove that a good turn of speed may be obtained in the face of heavy weather without undue pounding or otherwise stressing the craft.

The Cabin

The boat is controlled from a neat cabin, which is entirely open at the rear. The helmsman is provided with a seat on the port side, while immediately above the helmsman's head is a hatch in the roof of the shelter, giving additional visibility in case of necessity. The reverse gear and clutch levers are conveniently placed, whilst a neat instrument board centralizes the engine controls. There is ample room at both sides of the engine, the large hatch above enabling the power plant easily to be removed from the vessel should this become desirable.

The helmsman's shelter is provided with batten seats and cushions, comfortable accommodation being arranged for eight people, whilst on each side of the cabin footboards are fitted for passage from the fore to the aft deck or *vice versa*. The strength of the hull is exemplified in the fact that a pair of swinging eyes are provided fore and aft, for normally the vessel is intended for

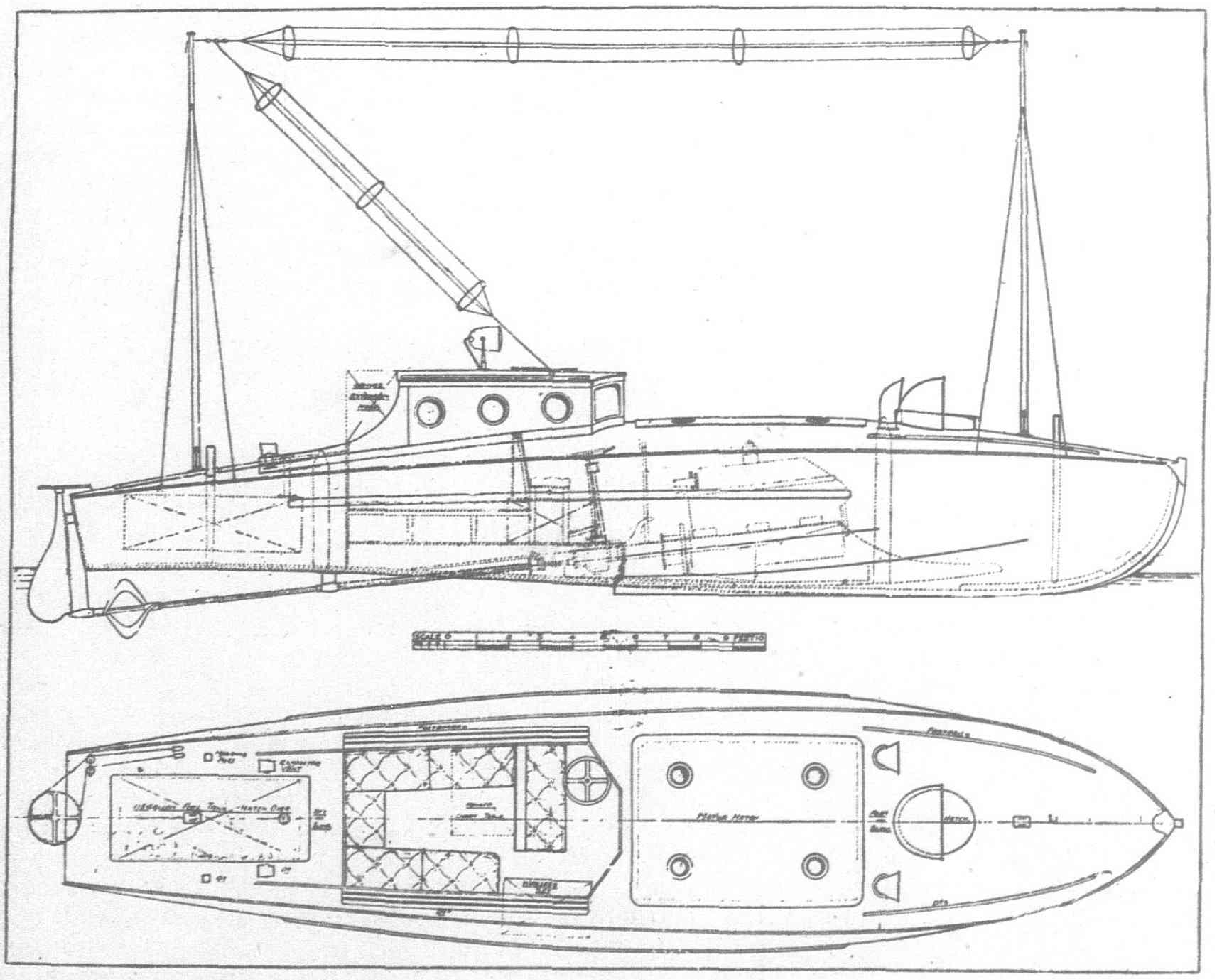


A Close up of the Hydroplane

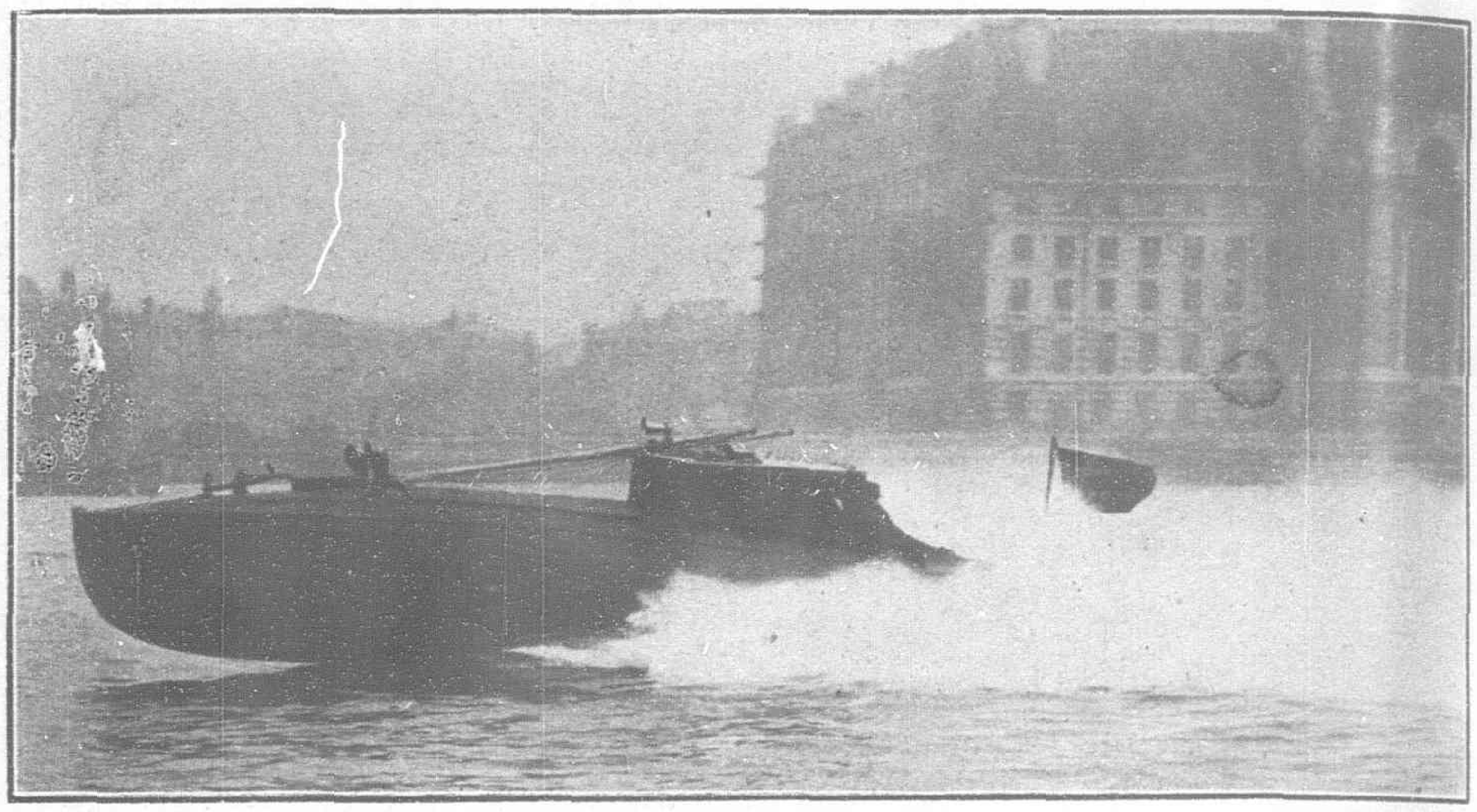
carrying aboard a parent boat.

The Comprehensive Wireless Iustallation

Mounted upon the starboard side, level with the helmsman's seat, is a wireless telegraph and telephone set, which is just visible in one of the illustrations. A wireless aerial is carried on light masts fitted in tabernacles fore and aft. The capacity of this set for telegraphy is limited roughly to a range of 50 miles for transmitting purposes and up to about 250 miles for receiving. In order to avoid damanging the instrument by reason of vibration in rough weather the mounting is upon substantial rubber strands, which effectively damp out any shock which might lead to trouble. In addition to the wireless equipment, the forward mast is provided with a Morse lamp and a small yard for flag signalling. A point of interest is the fact that detachable bullet-proof plates are provided for fitting over the more vital portion of the hull, such as the helmsman's position, fuel tanks and certain other points whilst the windows of the cabin are all of Triplex glass, which, to a certain degree, is bullet-resisting.



The general arrangement of the vessel. The spiral propeller should be noted.



At Full Speed

A Trial Run

So much for the actual features of the boat. It remains to add our impressions regarding her behaviour, and the builders kindly arranged for us to have a short run on the boat prior to the finishing touches being given before shipment. We boarded the craft at Westminster Pier and, after a short cruise at low speed, proceeded to put the boat through her paces. The acceleration and deceleration are both striking and the craft handles with the ease of a pleasure runabout. The hull is, of course, of a type that we have described on various occasions, and it is one which it would very hard to beat for the purposes for which the boat is intended.

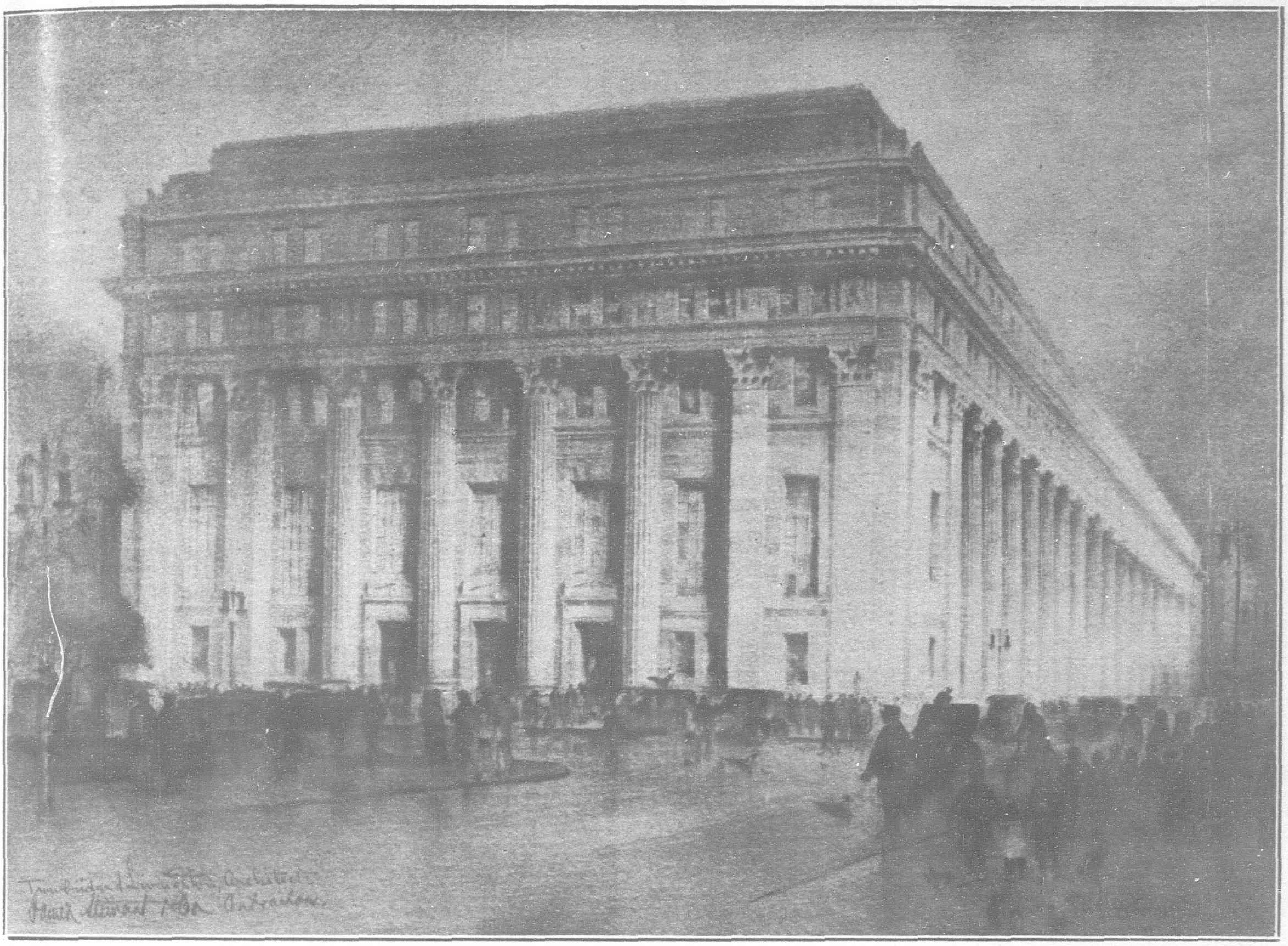
Apart from the exhaust, the machinery was quiet in operation and, unlike so many aircraft engines converted for marine service, it was a fully fledged marine unit capable of operating in constant service and with the minimum of attention. At 1,420 r.p.m., which were the highest revolutions achieved, the boat was comfortably travelling at slightly over 35 knots and, apart from the motion due to the somewhat lumpy surface of the water, no perceptible vibration was experienced. The cabin afforded excellent shelter, and with a few modifications the craft would have been ideal for those who revel in high-speed cruising.

A Wider Scope

We could not help thinking that there would be a definite field for such boats between, say, the Isle of Wight and the mainland, or even so far as the Isle of Man. Unlike so many high-speed craft which are mere racing shells, in this type of boat heavy weather should not disconcert a helmsman of average skill. At low speed the boat is not of particularly pleasing appearance, but immediately she commences to plane the trim is altered altogether and the lines of the craft become decidedly attractive. An excellent idea as to her appearance may be ascertained from the illustrations, whilst several other minor points relative to the general arrangements are revealed in the plans shown on the following page.

In normal circumstances it will not be necessary to sleep any of the crew aboard the hydroplane, but it would be possible to accommodate

(Continued on page 324).



The Mitsui Bank, Tokyo

THE dimensions of this building are 357 feet on the main facade and 165 feet on each of the two others. Excavation work was started in May and the building is expected to be completed in two years. The exterior material will be native Japanese granite throughout, although it has not been finally determined from which quarries the stone will be taken. The steel, of which there is nearly 10,000 tons, probably will be fabricated in Japan. The main counting rooms of the Mitsui Bank and of the Mitsui Trust Company will occupy practically the entire first floor, which will have a ceiling 45 feet high. The safe deposit and storage vaults of the two institutions will be located in the basement and sub-basement. The four floors above the main banking rooms will be devoted exclusively to the accounting, clerical and executive departments of the two banks. The specifications, drawn by Messrs. Trowbridge and Livingston, the Architects, call for materials and equipment of the most modern type. The completed structure will be one of the outstanding buildings of the World, and so far as we know the largest building devoted exclusively to banking institutions. The builders are James Stewart & Co., Inc.

New Holt Liner—" Orestes "

THE *Orestes*, the first of two motorships, specially designed for the special trades of the owners, Messrs. Alfred Holt and Company of Liverpool, and built by Messrs. Workman, Clark & Co., Ltd., was successfully launched on April 14, from the builder's North Yard.

The principal dimensions of the vessel are as follows :—Length 476 feet ; beam 58 feet ; depth to the upper deck 35 feet 3 inches, with a load displacement of over 15,000 tons. There are six cargo holds arranged to give the maximum space for bulky cargoes, machinery, etc., including two holds and 'tween decks fitted for the carriage of refrigerated meat, provisions, and fruit cargoes.

Loading and discharging are carried out on the most up-to-date principles, the cargo working gear including 22 derricks in conjunction with 18 electric winches, each capable of lifting loads from 2 to 10 tons. In addition a heavy derrick is fitted and capable of dealing with loads up to 55 tons.

The propelling machinery consists of twin sets of 8-cylinder Burmeister and Wain 4 stroke Diesel engines developing 6,000 s.h.p. for a speed of over 15 knots. To provide the necessary current for driving the electric winches, electro hydraulic steering gear, windlass, engine room auxiliaries, electric cooking appliances, and the lighting of the vessel, four large dynamos are provided, coupled direct to Diesel engines of the Burmeister and Wain type.

The *Orestes*, although mainly intended for the owner's cargo services, has accommodation for Eastern pilgrims similar to many other vessels of the Line.

The accommodation for officers, engineers, and crew is up to the high standard set by the owners. Ample galley arrangements, refrigerated and bulk store-rooms, are provided, and other features include wireless telegraphy, emergency dynamo, and electrical control to watertight doors.

Oil-Shale in South Manchuria

OIL-SHALE occurs abundantly at the Fushun coal mines in South Manchuria. The oil-shale there overlies the coal beds and is about 450 feet thick. The oil content is not uniform, being reported to be 5 per cent. on the average. It is roughly estimated that there are about 5,000,000,000 tons of oil-shale available, and by approximate extraction of 5 per cent. of crude oil, the yield may be estimated at 1,800,000,000 barrels of oil, or sufficient to supply Japan for three centuries. Recently, oil-shale has been discovered in Hokkaido (Japan), but oil content is only 3 per cent., and as the deposit is not extensive, it is regarded as of little value. Occurrence of oil-shale in intra-mural China has been known for sometime, but all the reports lack details. Valuable deposits are very likely to exist, it is thought, even in areas already covered and found wanting by geologic studies.

A sample of oil-shale from intra-mural China which was sent to Mr. H. Nishihara, (who makes these observations in the *Manchuria Daily News*) in 1921 was examined and tested by Dr. Asobu Naito according to his own method of analysis. The result was as follows:

Water (above 105° C)	8.0%
Gas	11.5%
Tar	22.5%
Fixed carbon	17.0%
Heat value	4,654. calories.

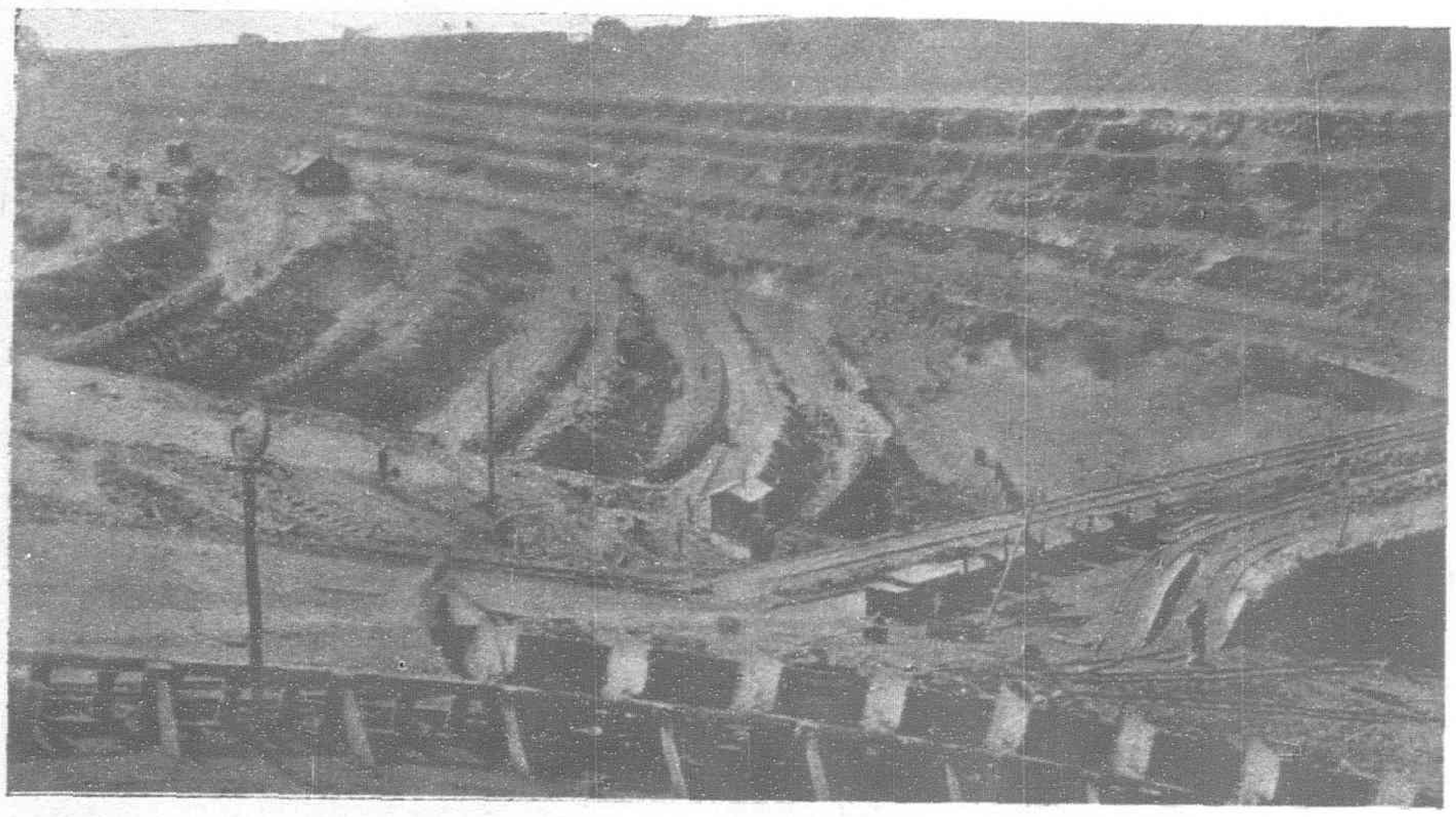
And further distillation of the tar gave the following:

Temperature C	Percentage
65° .. .. Began to boil	
100°	20.38
150°	11.12
250°	18.50
above 250°	50.00
Total ..	100.00%

Specific gravity: 0.815

22.5 per cent. of tar is equivalent to 67 gallons per ton of shale. The result of distillation indicates that it is high in gasoline and naphtha. The residue of the distillation is heavy oil, and has not been tested further, but it shows the presence of much paraffin.

As the location of this rich shale was not made known for some reason, nothing of its reserve or of character of deposit or facility of transportation can be stated. It is, however, possible that it will become the largest and richest deposit in the world. As it may be of interest to get a general knowledge as to the commercial value of oil-shale, the writer (Mr. H. Nishihara) has attempted to give an example calculated on a rough estimate.



This view gives a good general view of the shale deposits covering the coal seams in the Fushun open cast workings

The value of the products may be calculated from the above analysis as below:

Products	*% extraction*	*Loss in refining*	*Balance %*
Gasoline.. ..	31.5	10	28.35
Kerosene ..	18.5	15	15.72
Heavy oil ..	50.00	0	50.00

Product	*Qty. in koku*	*Price per 1/5 koku*	Value *in Yen*
Gasoline.. ..	0.476	13.00	30.94
Kerosene ..	0.264	7.00	9.24
Heavy oil ..	0.840	2.00	8.40
Total ..	1.58		48.58

The cost of refining in this case is approximately Yen 1.50 per *koku* of crude oil, the per 1.68 *koku* rate being Yen 2.52.

The value of refined oil	Yen 48.58
The cost of refining	2.52
Profit margin	46.06

This is equivalent to Yen 27.41 per *koku* of crude oil. It may be of interest to give another estimate of oil-shale.

Average contents of tar	7%	
Products of distillation:		
65°-170° C	23%	gasoline
170°-230° C	20%	Kerosene
230°-270° C	11%	Heavy oil
Over 270° C	27%	Paraffin
Residue	19%	Asphalt

7 per cent. tar is equivalent to 20.84 gallons per ton shale or about ½ *koku*, and the market value of the products may be calculated as under:

Product	*%*	*Loss in refining*	*Net %*
Gasoline.. ..	23	10	20.7
Heavy oil ..	57	0	57
Kerosene ..	20	15	19.0

Products	*Qty. in koku*	*Value per 1/5 koku*	Value in Yen
Gasoline.. ..	0.103	13.00	6.70
Kerosene ..	0.096	7.00	3.32
Heavy oil ..	0.235	2.00	2.35
	0.433		12.37

The average cost of distillation is Yen 1.00 and that of refining by the present known method Yen 1.50 per *koku* of crude oil. Cost of mining depends upon the nature of deposits and local conditions. In Scotland the per ton cost of mining is Yen 2.50. In the United States it is reported to be Yen 5.50 altogether. Supposing a company is capitalised at Yen 200,000.00 and treats daily 50 tons of oil-shale, whose oil content is 7 per cent. and distillation and refining products are as described above, a rough calculation may be made as follows:

Capital: Yen 200,000.00

Daily capacity; 50 tons shale or 15,000 tons per year of 300 working days.

Crude oil content; 7% or 7,500 *koku* per year.

Profit.

From refining 7,500 *koku* crude oil, Yen 24.74 by 7,500= 185,550.00

Loss.	Yen
To Debenture 10% on Yen 200,000.00 ..	20,000.00
,, Salaries, 20 officials, @ 3,000.00 ..	60,000.00

To Oil-shale cif Plant, @ 3.00	45,000.00
,, 50 coolies, 360 days, @ 1.00 ..	18,000.00
,, Distillation cost, 15,000 tons, @ 1.00 ..	15,000.00
,, Refining cost, 7,500 *koku*, @ 1.50 ..	11,250.00
Yen	169,250.00
Profit margin Yen	16,300.00

Which is equivalent to 8 per cent. on the capital or about the ordinary rate of annual interest on the capital.

One of the many difficulties in calculating the commercial possibilities of oil-shale is the average content of oil. Because of irregular distribution, to obtain a reasonably definite average of oil content in oil-shale is a problem impossible of solution. The writer will attempt to illustrate this by the following example.

Supposing in an area 5,000 ft. sq., oil-shale is found to a depth of 1,000 feet. If specific gravity of the shale is taken to be 2.5, then this will give the total quantity of 1,953,125,000 tons, say, 2,000,000,000 tons. Supposing then that 100,000 bore samples of oil-shale be taken at various points and from various depths, and that the analyses resulting range from 2 and 15 per cent. in oil content, the total percentage thus obtained divided by the total number of the boring, 100,000, will not represent the true average content of the oil, unless each bore sample represents the oil content in individual shale bed of equal thickness throughout the entire thickness of 1,000 ft. This means that the quantity of individual shale bed represented by individual analysis must be taken into account. For example, let us suppose that there be four shale beds of different oil contents represented as under:

(1)	1,000 tons	7%
(2)	5,000 ,, ...	10%
(3)	100 ,, ...	5%
(4)	20,000 ,, ...	2%

The total number of sampling is four, and of percentage 24. But the average content of oil in these four beds of shale is not 24/4 or 6 per cent. In other words, this does not mean that there is 26,100 tons of oil-shale with 6 per cent. oil content. The right calculation should be:

(A) *Shale bed*	(B) *Qty. in tons*	(C) *% oil content*	(D) *(B) x (C)*	(E) *Average*
(1)	1,000	7	7,000	—
(2)	5,000	10	50,000	—
(3)	100	5	500	—
(4)	20,000	2	40,000	—
	26,100		97,500	3.7%

This is to say that instead of 26,100 tons of 6 per cent. shale, there is 26,100 tons of 3.7 per cent. shale.

From the above it will be clear that where the distribution of oil in oil-shale is irregular and when it is difficult to obtain a definite quantity of the shale represented by a certain oil content, it is hard to make a reliable estimate for the working of any oil-shale upon a commercial basis. This is a simple matter and of daily occurrence, but very often and in many instances has not been taken into consideration. It is not a question of oil-shale only, but of any other mineral deposits occurring in a similar manner when the distribution of "values" is concerned.

Growth of the Rubber Industry in French Indo-China

THE introduction of the rubber tree into Cochin-China (for the growth is practically confined to this one country, in the Union of Indo-China), was effected in 1897. Two thousand plants from the Federated Malay States were distributed between the Botanical Gardens at Saigon, the Pasteur Institute at Nhatrang in Annam, and a number of French planters in Cochin-China. It was not until 1904 that the existence and fertility of the "terres rouges," or red lands were discovered, this being followed by the formation of a society to investigate the possibilities of the new culture. The results of these investigations proved so assuring that in 1907 the first rubber company in Cochin-China was brought into existence, quickly followed by several others, until the cultivation of the rubber tree became well established. The cultivation of rubber developed so rapidly that at the end of 1917 the area under rubber was estimated at over 50,000 acres; the number of trees planted at 6,000,000, of which 1,000,000 were in yield; and the capital engaged at 40 million francs. The most recent statistics, those of 1922, give the following figures:—Area planted, 75,000 acres; trees planted, 8 million; and trees in yield, 4,400,000. The province of Thudaumot alone contains 3,660,000 trees, of which 3 million have been tapped. The export of rubber has risen from 37 tons in 1908 to 5,000 tons in 1923 (the latest year for which figures are available), notwithstanding that it was only in 1915 that attention was paid to the serious cultivation of rubber for export. The yield of latex in 10 to 12-year plantations is 300 lbs. per acre.

In the provinces of Baria, Tayninh, Thudaumot and Gambodia, the twelve largest plantations cover 144,000 acres, although it should be noted that these areas apply to the extent of land acquired, and that the area actually planted is far from reaching these figures. The smallest plantations, which are situate in the province of Cholon and Giadinh, possess the largest number of trees (1,660,000).

A Rubber Tree Being Tapped

The methods of cultivation were at first taken from the neighbouring rubber growing countries of the Malay States and the Dutch East Indies, but the trees are spaced at 22 ft., and even at 33 ft. in every direction, with large avenues for aeration. This permits intercalary cultures such as rice, maize, groundnuts, and, on the large plantations, coffee, tea, and sugar cane, until the trees are productive, and afterwards. Up to 1916 the trees were tapped daily. After that year, once in three, four or even seven days, as it was noticed that daily tapping exhausted the trees and prevented the rapid healing up of the bark. The future of rubber in Indo-China appears to be bright. The present annual production amounts to about 6,000 tons, and when all the trees now planted are tapped it is estimated that this figure will rise to 10,000 tons.

The Old Style of Transportation in Mongolia

The New Style after the Trucks came in

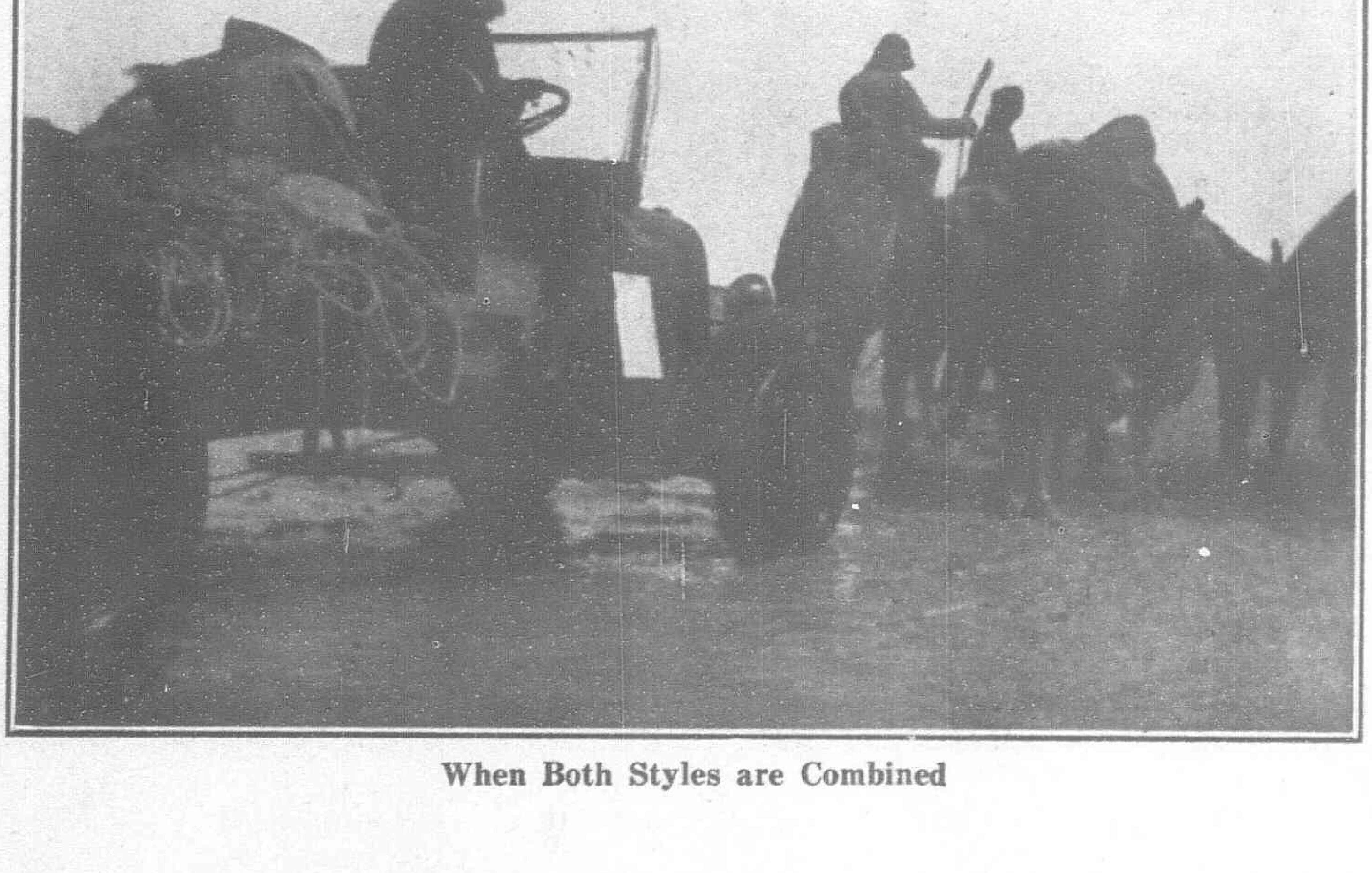
Motor Transport in Mongolia

MOTOR TRUCKS are slowly displacing the Camel Caravans which for centuries past have been the means of transportation in the arid plains of Mongolia. There has always been a considerable trade between Mongolia and Northern Manchuria, the chief marts being Manchouli and Hailar. At both of these places numbers of Mongol traders are to be met with and all transactions are carried on either by barter or in silver, as the Mongolian is no believer of paper-money of any sort. Sheep and camel wool, horse manes and tails, raw ox-hides and untanned sheep-skins, furs and pelts, deers' horns and musk, as well as cattle and horses, are exchanged and bartered by the Mongols for piece goods of all sorts, tea and tobacco, silks and velvets, iron and tin utensils, haberdashery and notions.

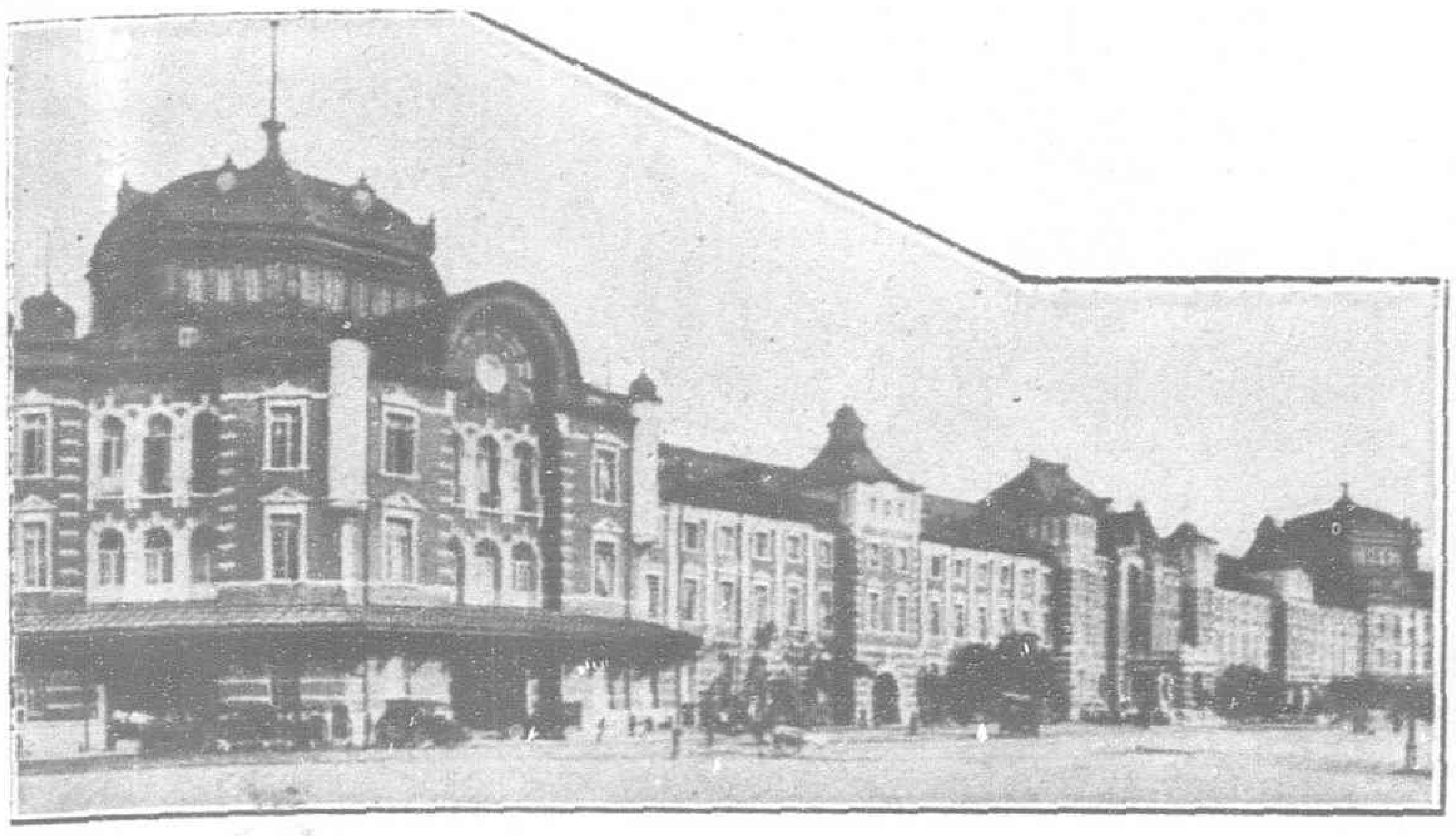
Though motor-trucks have been running between Manchouli and Urga for the last few years, chiefly carrying human freight, it is only a couple of years ago that a wealthy Mongolian Co-operative were induced to buy some trucks.

Hailar, which is an important town situated on the Chinese Eastern Railway and on the northern slope of the Hinghan Range, is about 300 versts east of the actual Mongolian boundary and 1,200 versts from Urga. The distance is covered by the Model 505 F Fiat trucks of 1½ tons capacity and carrying a full load of some 130 poods, of which 75 poods consisted of piece goods, in six days against 35 to 40 days that is required by camel caravan. The average distance travelled in a day is 280 miles, whilst the nights are passed in the open. The country is most suitable for motor-cars and consists of rolling plains or steppes, there being two rivers to cross. The Ursoun River is but 180 versts from Hailar, and is negotiated by a bridge which has been built by the Chinese authorities. At the actual frontier there is a Mongolian military post which is lodged in native yurts, and where documents are shown and examined,. There are no other formalities until eight versts out of Urga, where there is a Mongolian Customs post and, where a Customs official accompanies the cars to the Customs located in Urga itself. The Kerulun River, which is some 280 versts from Hailar, is also crossed, and the route then taken follows the river course till nearly Urga is reached. There is one town on the way—Samboys, which is in Mongolian territory and some 500 versts from Hailar. Close to the river bridges are located collecting stations for wool, all the important Hailar firms having their representatives, usually Buriats, who speak Mongolian, Russian and Chinese, on the spot, and living in yurts.

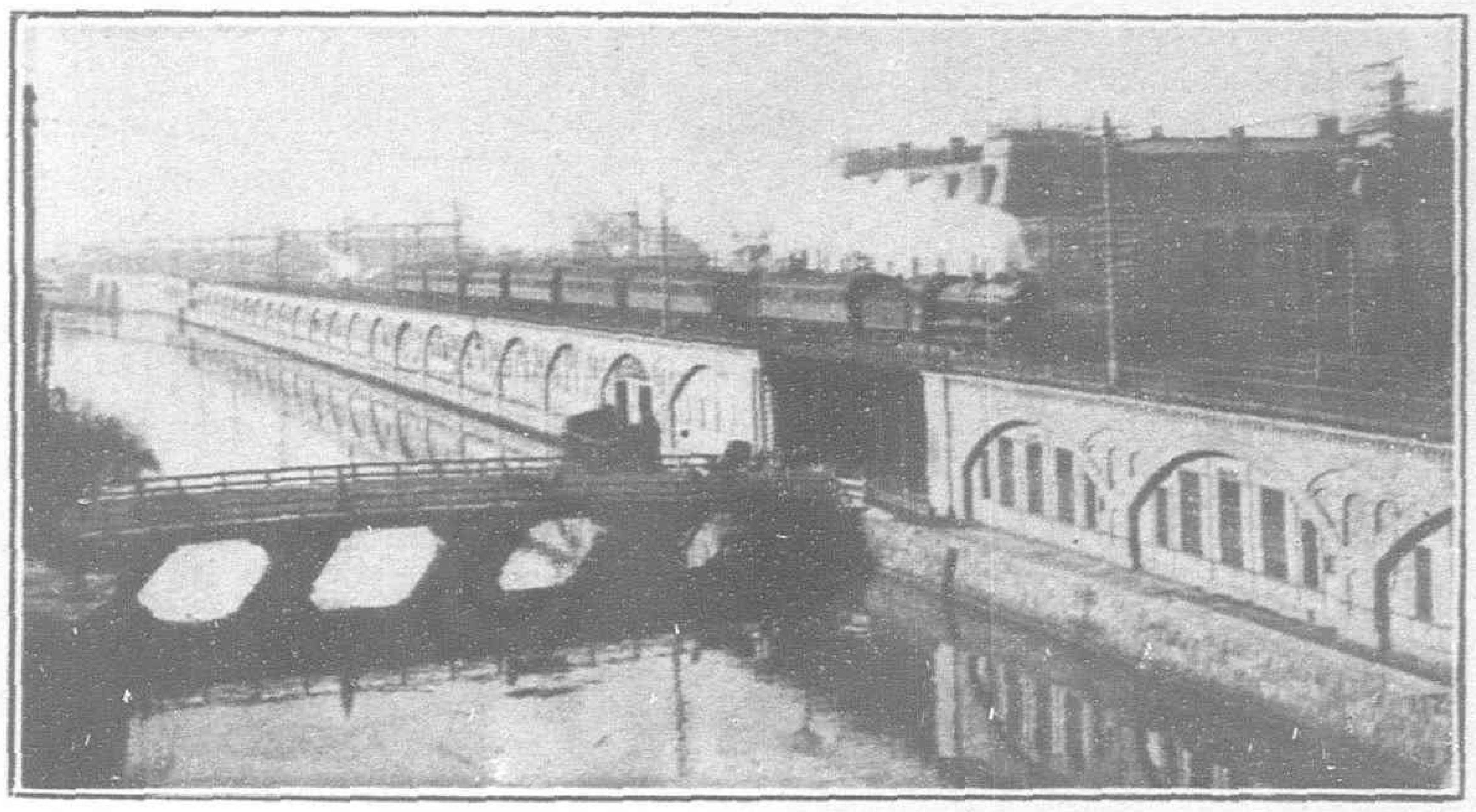
On the return trip the trucks came back empty, and the distance was covered in three days only. Owing to the activities of Soviet Organizations at Urga who are buying up all raw Mongolian products, and on account of the difficulties put in the way of traders wishing to export goods to Manchuria, trade with the latter is practically at a standstill, with the exception of small lots of products that the Mongols themselves bring in from distant parts off the regular trail. These semi-official organizations of the Soviet at Urga are buying up whatever they can lay their hands on, and have their own transport, consisting of numerous motor trucks which are running regularly between Urga and Kiahkta and Vershi-Oudinsk. Here the Mongolian exports, consisting of wool, skins, furs, etc., are shipped by train direct to Vladivostok by the Amur Railway and Habarovsk and thence abroad. Thanks to the attention that is being paid to this important Mongolian trade and the facilities that are being granted to shippers who can get a through bill of lading to the Pacific port from Urga itself, Mongolian exports into Manchuria have fallen to a minimum.



When Both Styles are Combined



The Tokyo Station



Elevated Rail Road near Tokyo Station

The Railways of Japan

By Douglas G. Haring

THE American going to Japan for the first time will probably make uncomplimentary remarks about the railways. He may keep it up for some years. Then, returning to America, he may be surprised to find himself saying equally uncomplimentary things about the American system. Each has its points of superiority.

Our American arriving in Japan will first note the smallness of railway equipment, along with everything else in the "Sunrise Kingdom." The railways are narrow-gauge, and have developed to the point where a change to wider gauge is almost beyond the financial power of the empire. He will probably make pointed remarks about the bad manners of a large part of the Japanese public—about the mountains of baggage piled in the aisles of the trains, and the refuse heaps which accumulate in those same aisles as the passengers gradually consume boxes of oranges, rice and pickles, together with numerous bottles of beer, whisky and a harmless soft drink which bears the formidable name of "champagne cider." Somehow every Japanese seems to feel that he will risk his soul if he stops eating and drinking in the course of a journey, save indeed as an occasional noisy snooze may be necessary. At every station persistent vendors of food and drink come to the rescue and save the passengers from the pangs of hunger or thirst.

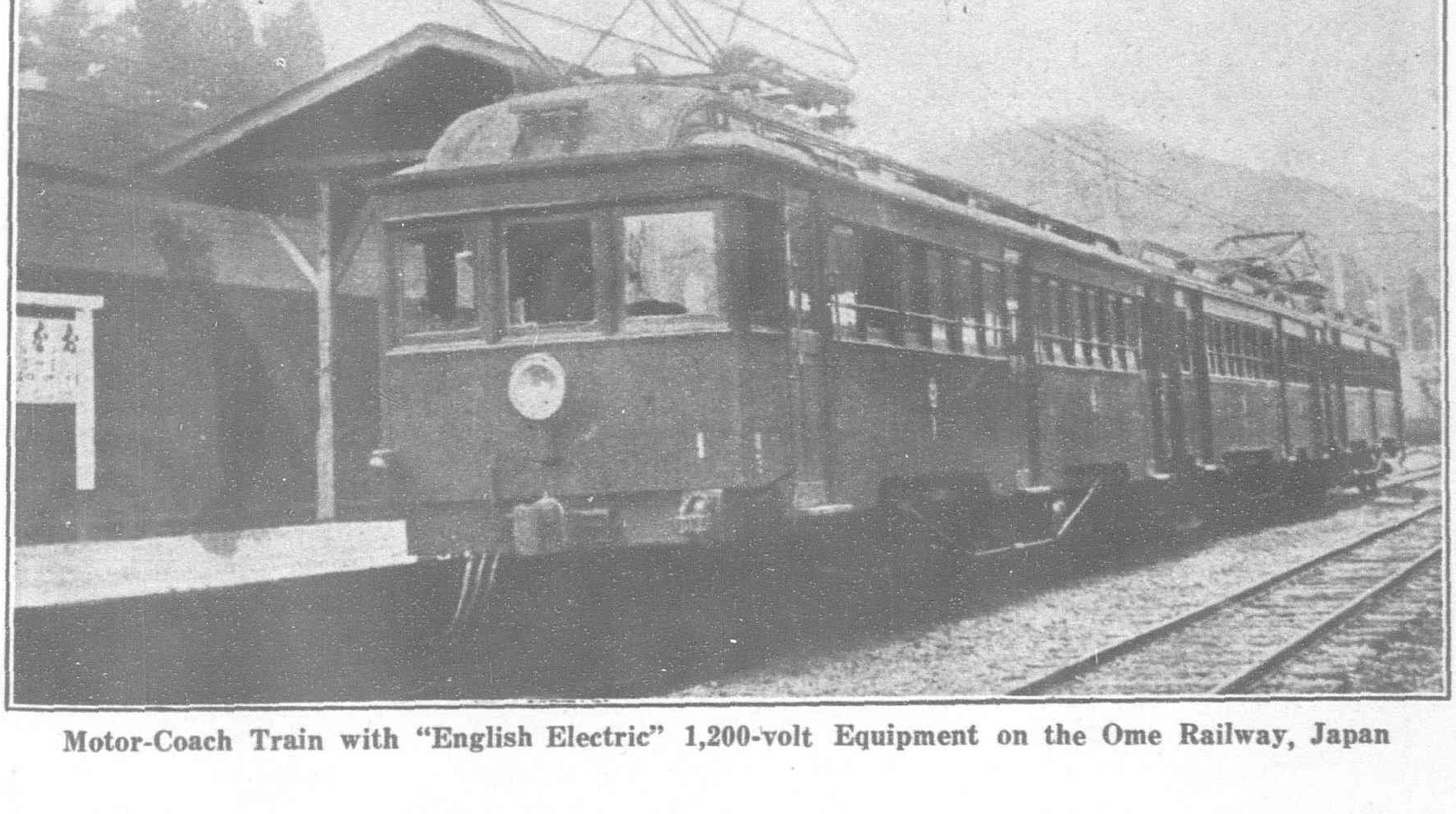
The American traveler will also have something to say about the use of the aisle of the car for a dressing room.

Tough on the Tall Ones

The sleeping car in Japan is the institution which makes or breaks the American traveler. The narrow gauge of the track necessitates narrower cars, and hence narrower berths. Only the berths in the U.S. Shipping Board's liners can equal a Japanese sleeper berth for narrowness and convexity of surface. But the fearfully and wonderfully made berths of the Shipping Board must yield to the Japanese sleeper, for the Shipping Board at least figured the length adequately. A sleeper berth in Japan is designed for Japanese. That makes it six inches or a foot shorter than the American variety. The writer, being short for an Occidental, can exactly fit into them—his head touching the top and his feet touching the bottom. No room for rattling! But woe to the tall person. He will dream of Procrustes and his bed before the journey ends.

If the season be summer the sleeper will be without curtains, each berth being provided with a mosquito net. If our American be wise, he or she will decide to do as the Romans do, and forget that curtains are lacking. The Japanese can be trusted at such times to mind their own business, and they expect the other fellow to mind his as well.

Americans love speed, and Japanese trains are slow. The stops are innumerable and the cars are unusually crowded almost to suffocation. Thirty-three miles in two hours and a half is the regular schedule of express trains on one level stretch of track near Kobe!



Motor-Coach Train with "English Electric" 1,200-volt Equipment on the Ome Railway, Japan

But They're on Time—And No Tips!

After years in Japan a return to America may provide its surprises. Of course the American trains are luxurious, especially the through trains across the continent. But the ointment contains several flies. Before long one gets his schedule upset by a delayed train, and then it suddenly dawns on him that never in Japan has he seen a train late, except when earthquake or blizzard has upset the service. Then, especially in the Eastern States, he may run afoul of a dusky porter with a grouch, and begin to long for the unfailing courtesy and good cheer of the Japanese train boy, especially when he recalls that the latter expects no tip. The train boy in Japan hopes for promotion, and would far rather have you tell the conductor that he gave you good service than receive a generous tip. The negro porter in America feels that because of the color distinction he may not hope for substantial promotion, and his attention is therefore centered on tips. It makes a difference in the service!

American roadbeds are as a rule far worse than those in Japan. Our wider gauge makes trains easier riding, but on many lines the wretched condition of the track, combined with higher running speeds, make travel in America rough riding. Add to this the universal practice on American railways of starting and stopping trains with all the symptoms of a violent earthquake, and one's grouches against the Japanese railway system begin to soften a bit.

No Yards of Ticket

Then there is the buying of tickets! Does an American ticket agent ever tell the truth about which route is most direct and convenient? Who can tell, when starting on a journey, how many yards of ticket he will need and how many companies will finally divide the dollars he had to pay to get that imposing strip? Before long he begins to recall the unified government railways of Japan, where one little ticket is all he ever needs, and where at any station in the country he can buy direct to any other station, and where, there being no competing lines, the agent always tells him the shortest and best route and has no reason for selling him anything he doesn't want.

The traveler in America discovers that once on the train he has no easy time to discover the names of the stations *en route*. Often they are not marked at all. It is easy to recollect the many conspicuous signs at each Japanese station, written in both Japanese and English, informing even the laziest passenger of the place where the train has stopped. There, too, each car bears on its side a sign telling the destination of the train—something which would be a boon to the weary amid the confusion of the dozens of commuters' trains scattered over the land facing New York city from the Jersey side!

35-Ft. Hydroplane for Service in Japan

(Continued from page 318).

four or five in the forward part of the boat and in the cabin, if at night time such a course became necessary, although presumably the craft will largely be confined to day service.

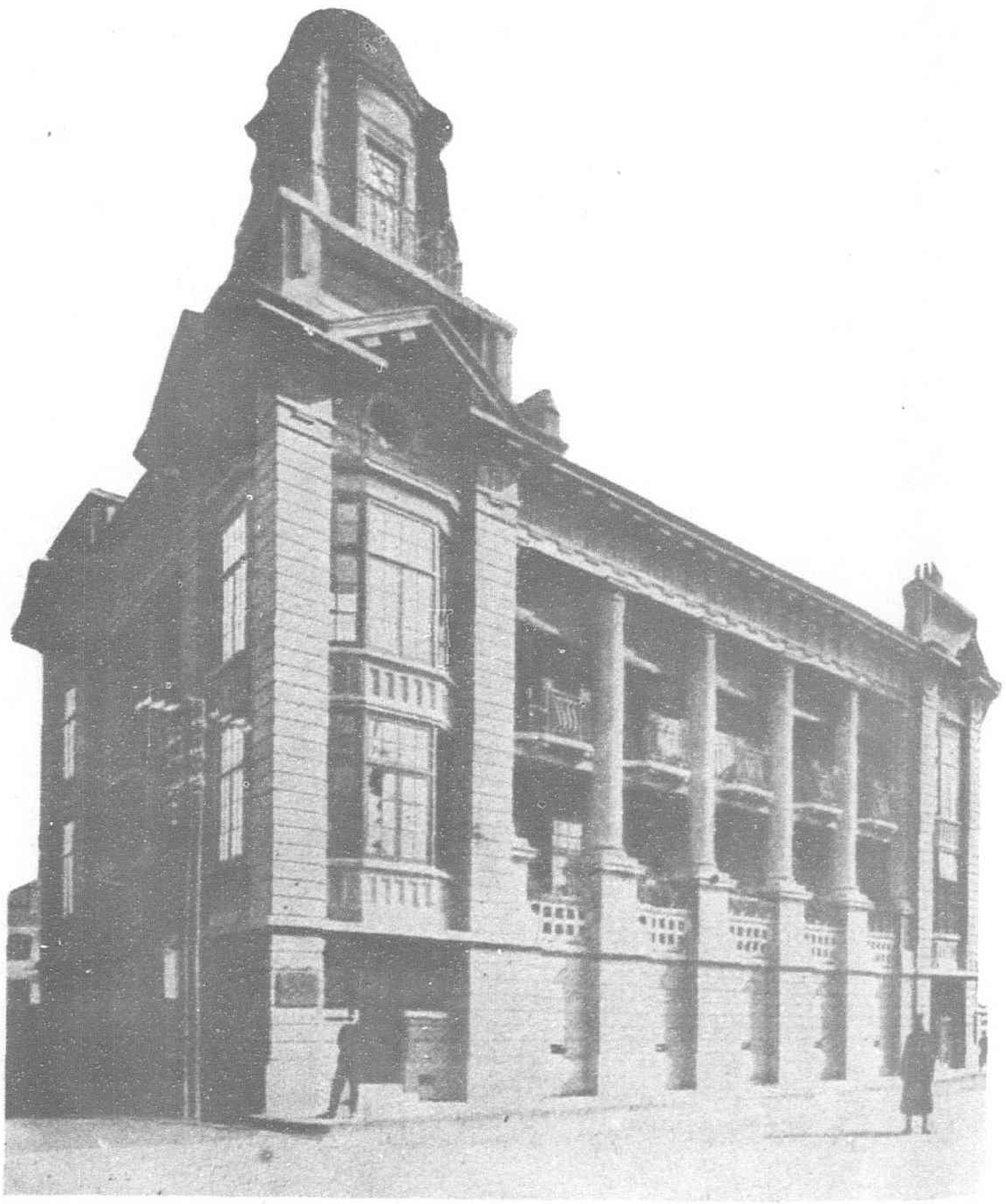
We found the cabin to be decidedly more roomy than we anticipated; excellent headroom and fair visibility are afforded, whilst, if needs be, there would be little difficulty in partitioning the engine space from the after accommodation. From the cabin the wake of the boat is of remarkable appearance, but it is particularly clean. We leaned over the side to get a good view of the water passing from the step; a large amount of spray is thrown out at each side, but this is only of a very light character and does not represent waste energy that a superficial examination might give one to suppose.

King Cheng Electric Co., Wuchang

The Wuchang Electric Light Co. is to transfer its property to the King Cheng Electric Co., Wuchang, newly organised by officials of the local Chamber of Commerce. In a draft contract between these two companies, the price for the transfer has been settled at $950,000, of which $150,000 is to be paid on the conclusion of the formal contract, the remainder by equal instalments within 20 years. The Wuchang Electric Light Co. was started 16 or 17 years ago by Shanghai merchants with German capital. At the outbreak of the Great War, it was transferred to its principal creditor, the Oriental Development Co., a Japanese concern. It suffered considerable losses until about March this year, when it ceased operations. The company owned two plants: the old plant in the vicinity of Liehshihsze inside the city equipped with two generators of 300 kilowatts, and the new plant in Tsuanwahsiang, outside Wushengmen, equipped in 1923 with two generators of 1,000 kilowatts. The King Cheng Electric Co. is privately owned with a capital of $200,000, divided into 20 shares of $100 each, fully paid up. The new plant will start operations about the middle of May with sufficient power to supply current for 2,000 lamps.

The Hankow Light and Power Co., Ltd.

THE service and supplies of the Hankow Light and Power Co., Ltd., provide instructive object lessons in the vast development which has occurred in the invention of contrivances of every description for the utilization of electricity for illumination and power purposes. Very interesting is the company's assortment of electric lamps embracing exquisite combinations of art and utility in beautiful and novel designs. Various agencies are held by this company for electrical goods of English manufacture, a point worthy of due recognition by anyone in Hankow desirous of securing the highest quality of electrical goods, whether it be a powerful dynamo, an electric fan, or any of the mutifarious things made subservient to the most wonderful of natural forces.



Offices of the Hankow Light and Power Co., Ltd.

Prior to the formation of the company in 1906, the foreign settlements of Hankow were without electricity either for illumination or power; and the activities of this important company, which gives employment to 120 persons, including a staff of British supervisors, have contributed considerably to the development of local facilities and resources. The capital is £67,100 and an average dividend of about 8 per cent. is paid on the ordinary shares.

The manager is Mr. R. P. H. Davis, who has occupied that position since 1908, and was previously connected with extensive electrical enterprises in England.

Railway Struggle in Manchuria

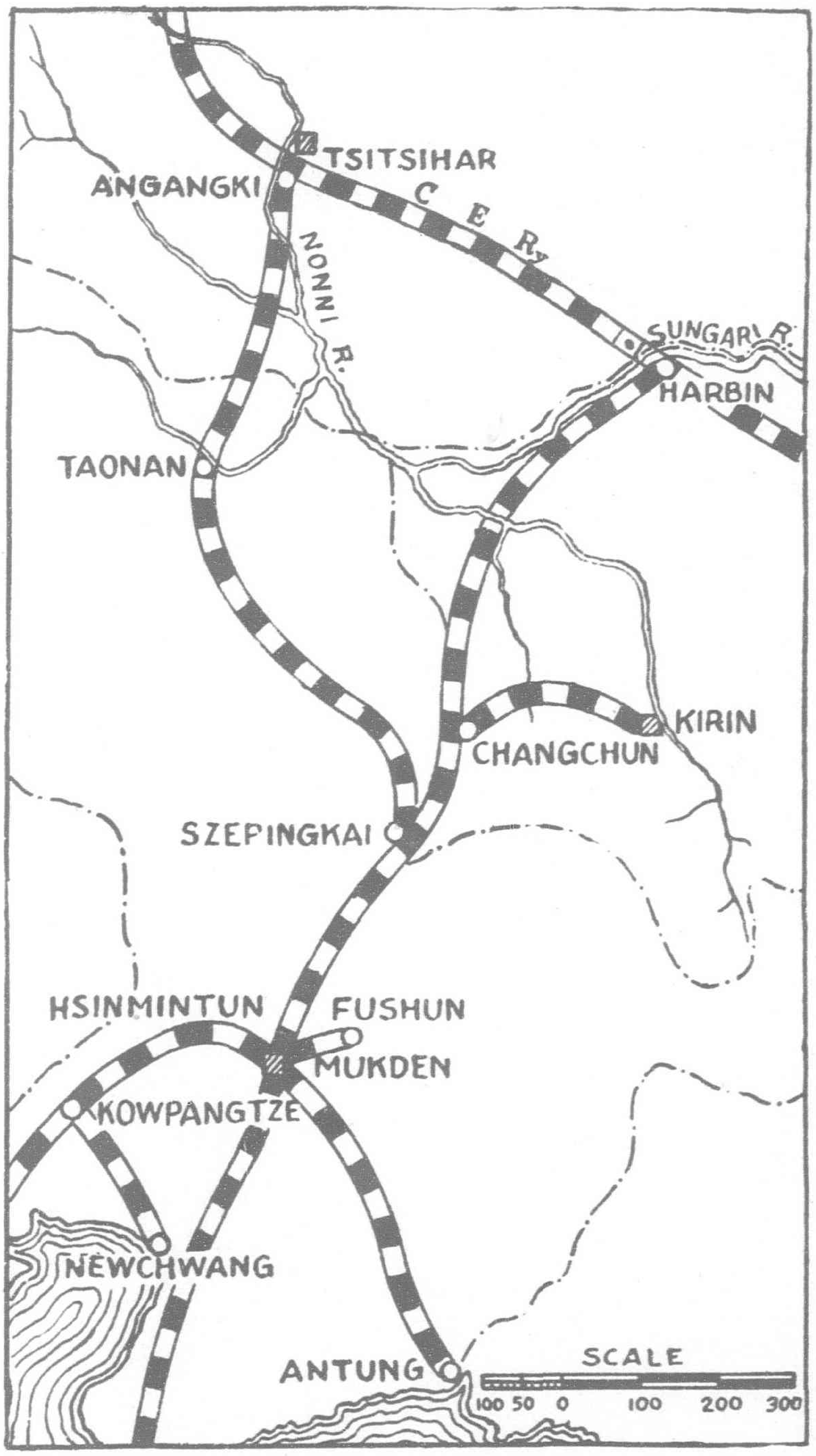
THOUGH the year 1925 was throughout a period of unrest and uncertainty, the inhabitants of the two northern Manchurian provinces were fortunate in comparison with those of many other parts of China, says Mr. U. Marconi, Acting Commissioner of Customs for Harbin, in his 1925 report. The district was entirely free from civil war, no serious disturbances of the peace occurred, neither plague, famine, nor floods were experienced, and communications with the outside world were never interrupted.

Owing to the proximity of Russia and to the presence of a Russian population estimated at about 200,000, Sino-Russian relations are of paramount importance to North Manchuria. The Agreements signed at Peking and Mukden in May and September 1924, and the change in the management of the Chinese Eastern Railway which followed in October, while putting an end to the abnormal situation existing between the two countries since 1917, have in their turn produced a crop of difficulties of a very delicate nature, which, however, have not resulted in any obstruction to trade.

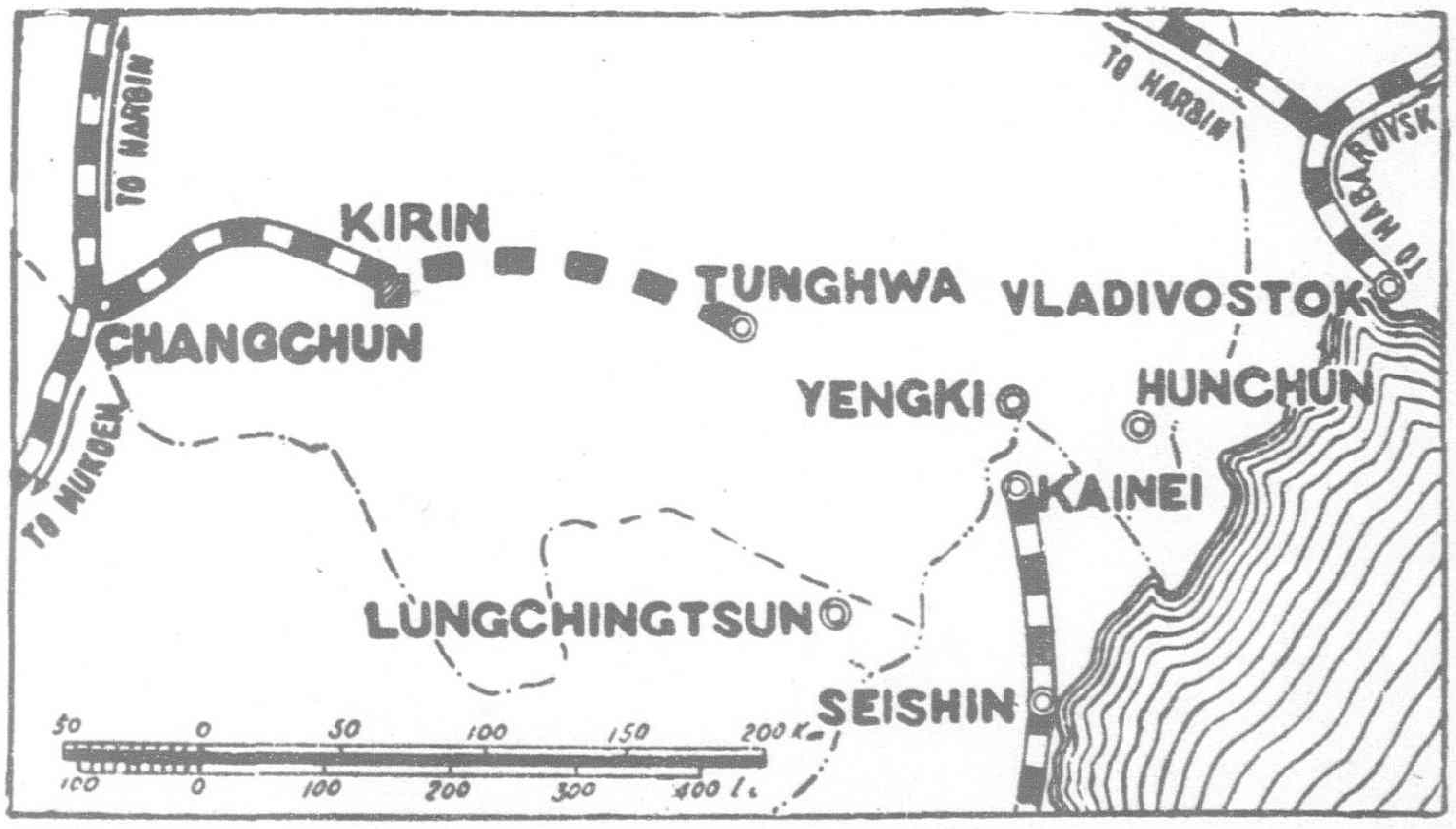
One consequence of these Agreements was a change in the relations between the Chinese Eastern Railway and the South Manchuria Railway, the Russians desiring to encourage by every means the use of the Suifenho-Vladivostok route as against the Changchun-Dairen one, and the Japanese on their side pushing on the construction of the Taonan-Tsitsihar line, which runs parallel to and will, it is expected, prove a formidable competitor of the southern branch of the Chinese Eastern Railway. The Japanese have also other railway extension schemes on foot, which, if realised, will tend to draw the produce of North Manchuria and Mongolia in the direction of Dairen. As a counter-measure the Russians have proposed constructing several branch lines connecting up with the main Chinese Eastern Railway line. The suggested lines are: (1) Angangki-Tsitsihar; (2) Hailin-Makiachuankow, crossing the fertile plain of Hulan; and (3) Mishan-Muling, traversing a coal-bearing district. The first-named line is intended to compete with the Taonan-Tsitsihar line mentioned above. Nothing definite has so far been arranged in connexion with the above proposals. However, no matter who builds the railways nor for what purpose they are built, their construction should eventually bring nothing but benefit to the district and its inhabitants generally.

An agreement between the South Manchuria and Ussuri Railways was reached in the summer for a redistribution of export freights on a Vladivostok 55 per cent. Dairen 45 per cent. basis, that is to say, should the stipulated proportion be exceeded, the railway profiting thereby must compensate its neighbor for the loss entailed.

In the Trade Report for 1924 mention was made of the declaration in November of that year of a "free area" in the port of Vladivostok, with a view to attracting exports in that direction. That the object has been to some extent attained is now, after the lapse of 14 months, clear, but the degree of success has fallen considerably short of what was expected. Vladivostok has not yet introduced any system like the one in operation in Dairen, whereby the shipper, as soon as his beans or other staple cargo have been stored in one of the South Manchuria Railway Company's warehouses, can take his warehouse receipts to any of the foreign banks in Dairen and obtain his money less a small percentage for handling charges. On the other hand, foreign goods destined for Harbin pay no duties at Vladivostok and are first liable to examination at their destination, where Customs formalities may be performed in the presence of the consignee himself. If such goods are imported through Dairen, not only have they to pass the Customs and pay duty there—thus making the employment of a forwarding agent necessary,—but also they are liable to tran-shipment at Changchun, whereas from



The Taonan-Tsitsihai Railway



Kirin-Lunghua Railway

Vladivostok to Harbin all freight proceeds direct. The one-third duty reduction privilege which all goods imported or exported *via* the Chinese Eastern Railway still enjoy and the Duty Free List (provided for in the Sino-Russian Treaty of 1881) are further factors in favor of Vladivostok.

Up to the present time British and American importers have not used Vladivostok to any considerable extent, while Japanese firms naturally contiue to prefer the Dairen route. Consignments of machinery from Germany, kerosene from ports in European Russia, and sugar from Java were imported into Manchuria *via* Vladivostok during 1925.

Sulphur Mines in Shansi

WANGFENGSHAN, Taiyuan, Shansi province, is a sulphur-producing center. Deposits have been discovered in more than a dozen places, including Paishuikou, Shihtsaokou, Kaoshengmiao, Yuanchishan, etc. The mines are located mostly in hilly or mountainous regions, where, in the absence of transportation facilities, large scale mining is still impossible. Four companies, the Wang Feng Sulphur Mining Company, the New Sulphur Mining Company, the Han Wen Jen Sulphur Mining Company, and the Ching Feng Sulphur Mining Company are working on a comparatively large scale, in addition to about a dozen private miners, whose output is hardly worth mentioning, owing to the limited amount of their capital.

Sulphur ores generally occur in sandstone and calcareous sandstone strata, the latter, especially, bearing close relation to sulphur ores. The ores found in the calcareous sandstone strata are always in a pure condition. The layers, as a rule, are only about one or two feet thick, and the shafts are always narrow, admitting one miner at a time, who can only work on all-fours. In Wangfengshan there are also a few coal mines, but the sulphur mines are never found in close proximity to the coal. Wherever the coal mines are found, all traces of sulphur ores disappear.

The sulphur ores worked out from the Wangfengshan mines are always inter-bedded in sandstones, but easy to separate. When a stone containing the ore is broken with an iron hammer, the sulphur ore freely separates itself from the stone. The method of purifying the ores is simple and crude. The outfit consists of only a porcelain jar and a fireclay funnel in the shape of a trumpet. The narrower end of the funnel is inserted into the porcelain jar, which is used as the receptacle, and sulphur ores are loaded into the funnel through the open-mouthed end. The porcelain jars, usually in a set of three or four with as many funnels, are then placed in a hole just below the ground so as to leave the open-mouthed end of the funnels just above the ground. The funnels are then surrounded with fuel, usually coal, which is further banked on all sides with earth so as to facilitate burning. A fire is then built in the coal, and fanned with bellows. When the coal reaches a sufficiently high temperature to melt the ores, the sulphur is reduced to a liquid state and flows into the porcelain jar through the narrower end of the funnel. The burning of the ores goes on for about 24 hours before all the sulphur ores in the funnel are melted. They then flow into the jar. The residue is discarded. The liquid sulphur in the jar is then taken out with an iron ladle or dipper and poured into small pottery vessels. When the sulphur again solidifies on cooling, it becomes greenish yellow in color. The article is then ready for the market.

The output of the four sulphur mining companies mentioned above varies according to capital and working capacity. The Wang Feng Sulphur Mining Company is financed with a capital of $15,000, and has been in existence since the Manchu dynasty. It was promoted by Liu To-ching, and its mining area covers about 500-600 mow. During the first few years of the Republic the company was highly prosperous, due to the absence of competition. A considerable quantity of sulphur was produced yearly. But since the establishment of the three new companies, its business has suffered a set-back. The New Sulphur Mining Company was promoted by Kuo Yao-tong, with a capital of about $6,000. Its yearly output at present is estimated at between 70,000 and 80,000 catties of purified sulphur. The Han Wen-jen Sulphur Mining Company was started by Han Wen-jen with a capital of $10,000. It has a mining area of 100 mow and turns out over 100,000 catties of purified sulphur yearly. The Ching Feng Sulphur Mining Company was promoted by Wang Shao-lu with a capital of several thousand dollars. This company has a rather limited quantity of sulphur ores of its own production, but collects the purified sulphur from the neighboring small scale miners and sells at a profit. The dozen other small scale miners have a yearly output of several thousand to ten thousand catties each. Before 1921 the total output of sulphur from the different mines in Taiyuan amounted to 800,000—1,000,000 catties, but the quantity has been decreasing since the organisation of the Bureau for Government Monopoly of Sulphur and Saltpetre. This Bureau forbids unauthorised sale and transportation of sulphur, and this has in some way interfered with the business of the mining companies, whose operations are now frequently suspended.

In 1916 and 1917 the total yearly output of the Wangfengshan mines alone amounted to nearly 1,000,000 catties, which found a ready market in both Shansi and the neighboring provinces such as Shantung and Honan. A large quantity of sulphur is consumed yearly by the Government Arsenal at Tehchow, Shantung province, and the balance is chiefly sold to firecracker makers. The Government arsenal and someother provincial government factories in Shansi province also consume certain quantities every year. The market price has advanced greatly in recent years. In 1917 and 1918 a catty of sulphur was sold at $5—$6 on the Shansi local market, but now it has gone up to over $10. The tax on sulphur has also been raised from 18 cash to $0.08 (eight cents) a catty. Since the inauguration of the Government Monopoly of Sulphur and Saltpetre, the public is forbidden to sell and purchase sulphur privately. Any miner with sulphur to sell must first bring the article to the Bureau for examination and price-fixing. Any private buyer of sulphur, if he is a native of Shansi province, must first obtain a licence from the Bureau, while exporters from other provinces must have their consignments covered with a permit from the Ministry of War. Unauthorised purchase and transportation of sulphur are strictly forbidden.

The Government Monopoly of Sulphur and Saltpetre was reorganised in 1920 from the former Government Monopoly of Saltpetre. It has 14 branch offices, including four inspectorates, and 12 agencies throughout the province. It has a capital of $50,000 appropriated from the Shansi treasury. The agencies are generally farmed out to local public bodies such as the district Chambers of Commerce and the local Government revenue offices and also to wealthy private persons. A prospective agent must pay a certain deposit and enter into a contract with the Bureau. The contract runs for a year, but is subject to renewal at the expiration of that term. Up to the present, agencies have been established in the following districts: Pingyang, Hoku, Chiehchow, Hunyuan, Tatung, Sohchow, Hoshun, Linhsien, Puchow, Kiangchow, Sichow, and Hohsien. Each of the agencies has jurisdiction over more than one district. For instance, the agency at Pingyang has jurisdiction over seven or eight districts. So these agencies, together with the branch offices, cover practically all the districts in the province. As most of the districts in Shansi do not produce sulphur, the agencies and branch offices there monopolise the local market, no trade being allowed between private persons without the knowledge and permission of these authorities.

In addition to the mines in Taiyuan, which at present form the best known sulphur producing center in the province, sulphur ores are also produced from the mines at Chingchiachwang and Yaokou, Fengshihsien and Shangyangpu, Lingshihhsien. In those regions no mining company operating on any large scale has yet made its appearance. The mines are being worked by a number of private persons, whose method of mining is primitive. The total yearly output at each place is estimated at a little over 10,000 catties only. Iron pyrite ores are also produced in many places in Shansi province. From this ore sulphur can be extracted. For the present, no official statistics are available in regard to the mines yielding pyrite ores in the province, although in certain places moderate quantities of such ores have been turned out by small-scale mines. The regulations issued by the Government Monopoly of Sulphur and Saltpetre include the iron pyrite ores among the Government monopolies, and prohibit the mining of such ores by private persons without authorisation. It is believed that large quantities of sulphur can be obtained from the iron pyrite ores in Shansi province yearly, if large scale operations could be started in the mines.

The Oil Electric Locomotive

THE recent purchase of a 60 ton oil-electric locomotive by the Central Railroad of New Jersey followed closely by the acquisition of a 100 ton type by the Long Island Railroad marks a new era in railroad engineering. If the service performances of these locomotives bear out the demonstrating performances, the wide substitution of the oil-electric locomotive for the steam engine in railroading in the United States is foreseen.

The oil-electric locomotive, with its internal combustion engine and electric generator, is the product of three of the leading manufacturers in the engineering field—the American Locomotive, the General Electric and the Ingersoll-Rand Companies.

The oil engine, which is the product of the Ingersoll-Rand Co., has six cylinders and is of the 4 cycle, single acting, vertical type. Fuel oil is injected directly into each cylinder through two opposite spray nozzles situated in the combustion chamber. This fuel is delivered, under pressure, by a pump directly connected with the main shafting. The heat resulting from sufficient compression ignites the oil and the power stroke is thus started—in other words the action is similar to that of an ordinary automobile engine with the heat of compression doing the work of the spark plug. The pump which injects the oil serves all six cylinders and is automatically controlled to feed each chamber as oil is needed. For efficient action the engine requires that the oil have a flash point of not less than 150° F. A forced feed system of lubrication is used and functions through a gear-driven pump in the crank case. Circulating water is distributed to all parts of the engine by a centrifugal pump attached to the crank shaft.

To start the engine compressed air at a pressure of 200 pounds is admitted successively to each cylinder, through mechanically operated starting valves. In order that there be a continuous supply of starting air, two small compressors are provided, one driven by an auxiliary engine and the other by the main oil engine. The latter compressor keeps the flasks of starting air continually charged.

Directly connected with the oil engine is a General Electric generator, with a voltage ranging from 200 to 750. The output is regulated by throttle to the demands made upon the dynamo by the tractive motors.

The control of the locomotive is extremely simple. The engineer has only to manipulate two control handles. One that serves as a throttle lever to control the output of the engine; while the other is a master controller or electric switch which puts the tractive motors either in series or in parallel as circumstances may require.

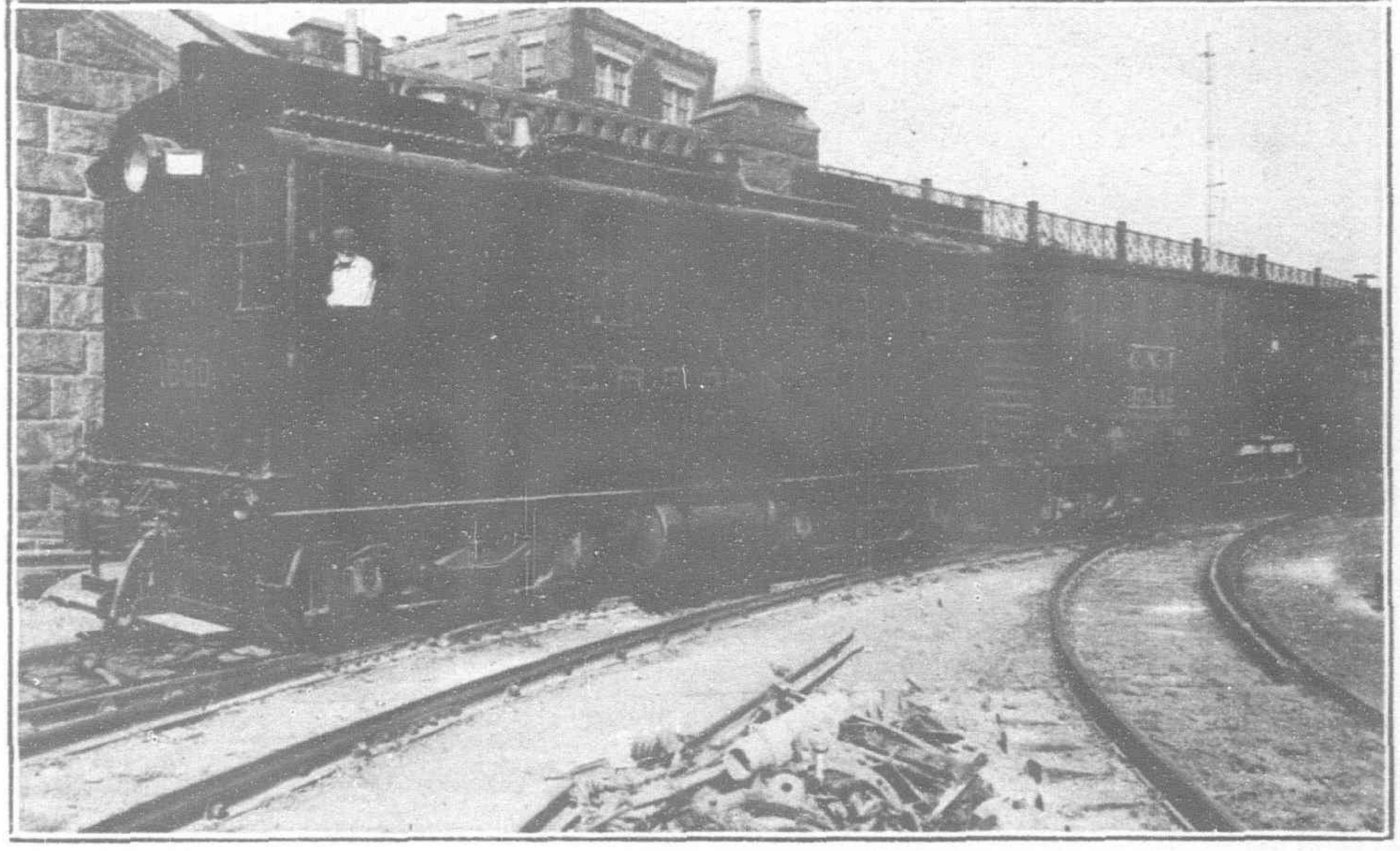
Therefore with the throttle lever set at any desired speed, the generator delivers to the four driving motors the amount of energy necessary to turn the driving wheel at the prescribed speed. The tractive efforts can thus be varied to suit any operating condition.

Up-to-date these oil-electric locomotives have been constructed for both slow speed switching and for road service. Two slow-speed types have been built weighing respectively 60 and 100 tons, and capable of developing 300 H. P. and 600 H. P. The smaller is capable of travelling at 30 miles an hour and exerts a tractive effort of 36,000 lbs. The larger unit can make the same maximum speed and develop a tractive effort of 60,000 lbs.

Designs have been developed for two road types. The 60-ton road locomotive will have a tractive effort of 23,000 lbs., develop 300 H. P. and have a maximum speed of 45 miles per hour. The larger type would weigh 85 tons and be able to make 55 miles an hour. The latter unit would develop 600 H. P. and exert a tractive effort of 50,000 lbs.

Performance reports disclose that the oil-electric locomotive is far more economical in cost of operating, than a steam locomotive of the same capacity. In the first place the thermal efficiency referred to the driving wheels of an internal combustion engine driven electric locomotive is approximately 25-27 per cent. Steam locomotives can show only 5 per cent. to 8 per cent. The interposed system of electric drive used in the new oil-electric locomotive protects the engine from the strains and shocks that a steam engine would have to content with because of direct drive. Also this absence of direct drive permits the engine to run at its most efficient, and, therefore, at its most economical speed—and the dynamo tractors, providing the equivalent of countless gear changes. And last, but not the least of the merits of the oil-electric locomotive is the way the generator and driving motors automatically adjust themselves in response to the demand made upon them.

The last few years have witnessed the gradual disappearance of steam in many industries. Electricity has frequently taken its place. But apart from what the oil electric locomotive represents as a notable advance in railway engineering, the development of this type of tractor promises to prove a source of great relief to thousands of people, now living close to railroad terminals, where they are exposed to smoke and to the noisy din of active or waiting locomotives.



The Oil Electric Engine on the New Jersey Central

F. E. Eldredge Appointed Commercial Manager Westinghouse Radio Department

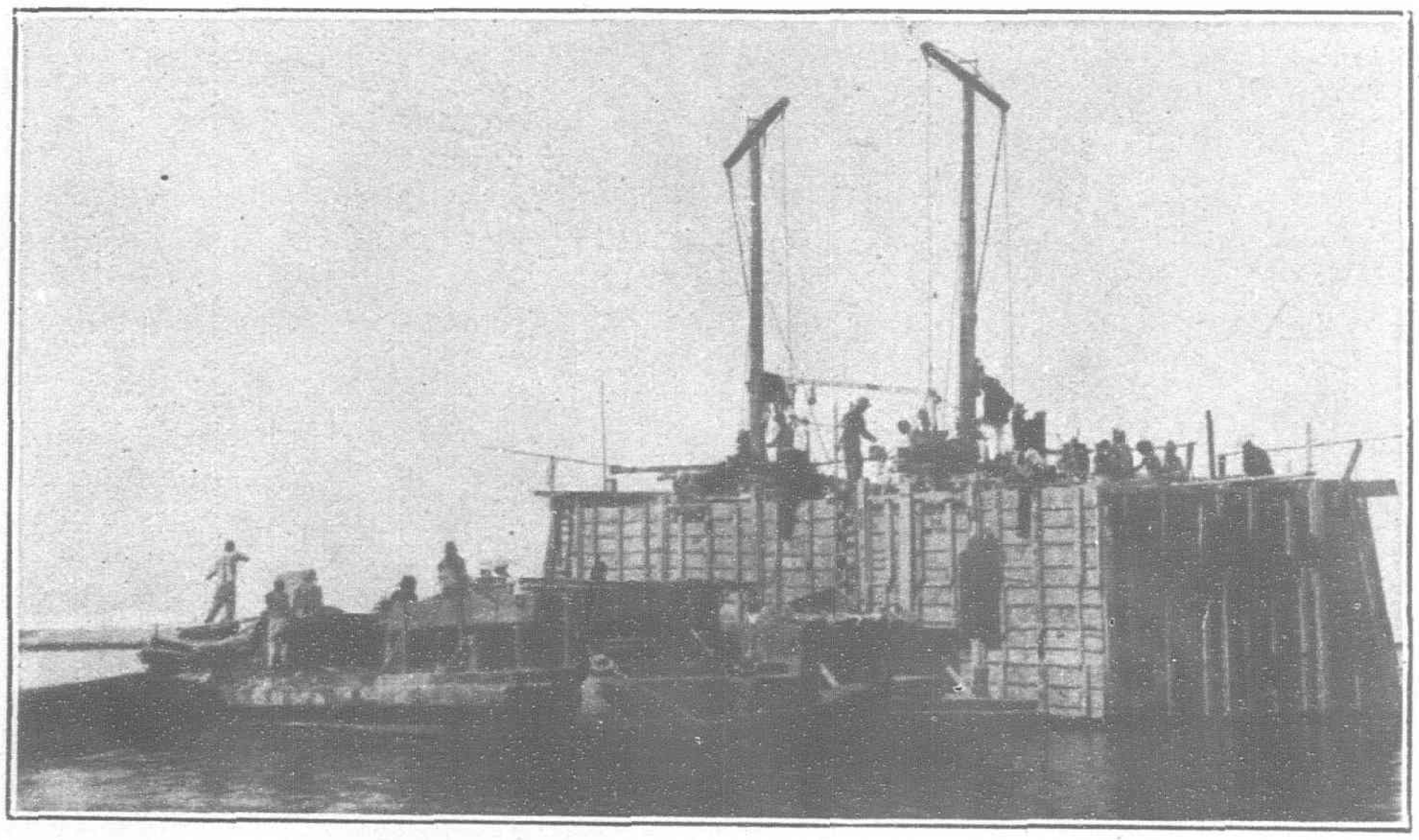
F. E. Eldredge has been appointed Commercial Manager of the Radio Department of the Westinghouse Electric & Manufacturing Company, succeeding to the position recently made vacant by the promotion of E. B. Mallory. He will make his headquarters at the East Pittsburgh Works of the Company and will also have an office in the Westinghouse Building, 150 Broadway, New York.

Mr. Eldredge holds the degree of Master of Science from Syracuse University. He enlisted in the Signal Corps of the United States Army in 1917, and when the war ended was serving as an officer, in charge of the inspection of all radio material manufactured in the Department of the East. He continued in the service, and after being made a first lieutenant in the Signal Corps of the Regular Army in 1920, was transferred to the Signal Corps Depot, Fourth Corps Area, Georgia, where he remained until 1922. Then he was sent to the Panama Canal Zone, as commanding officer of the 10th Signal Company in the Panama Division.

Mr. Eldredge in 1924 entered the service of the Westinghouse Company, in charge of the Government section of the radio department, and held that position until his latest promotion.

Harbor Improvement at Chefoo

THE Commissioner of Customs reports the following : The breakwater having been completed in December 1920 and the mole in December 1921, it devolved on the Commission to develop these adjuncts of the harbor in the fullest possible measure. To secure roads of approach to the mole and land for the Commission's purposes was the first necessity. Great difficulties were experienced in bringing these questions to a successful issue. Negotiations with Chinese landowners, who had not been slow in realising that sooner or later the Commission would have to pay dearly for the omission in previous years to secure land and approaches to the mole, lasted until August. The Commission finally secured some 36 *mou* of land below high-water level to the westwards of and adjoining the base of the mole and a 60-foot-wide road leading to the main street, which, besides the existing road leading to the boat harbor, will meet all requirements. The majority of the commercial element at this port having expressed itself in favour of the erection of storage godowns on the mole quay, light steel sheds of the removable type, and measuring 400 feet in length by 60 feet in width, were ordered. The Commission is furthermore committed, from resolutions passed at various meetings, to establish a system of transportation of goods to and from the mole godowns by means of trucks running on the existing rails ; to construct roads of approach to the main street and to the boat harbor ; to construct a seawall at the base of the mole on the northern boundary of its recently acquired property ; to reclaim this property by filling it to the level of the mole surface and to construct thereon sheds of trucks, workshops, etc. ; to culvert to the sea the creek which empties itself at the base of the mole ; and finally, when all these works have been completed, to open the mole to traffic. Other imporvements to the harbor, now in course of completion or to be undertaken, are the dredging of the North Tai Ping Wan to a sufficient depth to allow cargo-boats to work at all stages of the tide, and the dredging of the approaches to the jetties and to the mole quay, the latter to a 25-foot depth to permit of the successful berthing of deep-draught ocean steamers at the quay. The tug purchased at the beginning of the year from the Haiho Conservancy is justifying its existence by assisting deep-draught steamers to their berths and by towage when needed for these purposes. A Priestman grab-dredger, self-propelling, fitted with hopper doors, was also purchased during the year and is doing as well as can be expected, considering the difficult nature of the soil in the harbor. The appointment this year of a berthing pilot is not only of great material assistance in the berthing of ocean steamers, but also of great moral value for insurance purposes. Thanks, in a great measure, to all these harbor facilities, a direct ocean-steamer traffic is developing favourably.



Reinforced Concrete Caisson for Quay Wall on Mole

Light Waves and Others

By L. A. Hawkins, Engineer, Research Laboratory, General Electric Company

WHAT are the longest and the shortest waves on earth ? The longest wave on earth, or rather on water, is the tidal wave, which near the equator has a length from crest to crest of about 12,000 miles. The shortest wave commonly known is probably the tiny ripple produced by a light puff of wind on a roadside puddle, with a wave length of perhaps on eight of an inch.

What sort of a frequency converter would it be that could change all the energy of a tidal wave into such tiny ripples ? We may at least say that it would be a remarkable apparatus.

And yet every electriclamp operating on the usual sixty cycle, lighting circuit is producing a greater change of wave length than from tidal wave to tiny ripple, and doing it with 100 per cent. efficiency ; for the sixty cycle electric wave is about 3,000 miles long, while the longest light wave is only about three one hundred thousandth of an inch, and the heat waves to which the rest of the electric energy is converted, are most of then less than a ten thousandth of an inch long.

Within this astounding range of wave lengths spanned by our electric lamp, between the extremes of electric power transmission and light, lie all the radio waves, whose lengths are known in meters nowadays to nearly everyone, then the so-called Herzian waves, of which the shorter ones, from about one-tenth to a hundredth of an inch, were first successfully explored by our Nela Park research laboratory three years ago, and then the heat, or infra-red, waves, with a range of about three hundred to one.

And even when we reach the light waves, we are far from the lower end of the scale. Just beyond lie the ultra-violet, and then the Z-rays, and finally the gamma rays from radium, two hundred thousand times shorter than light waves, so short that to measure them in inches or millimeters would be more awkward them to measure the thickness of gold leaf in miles or kilometers, so that special units like Angstroms or millimicrons are used to describe them.

This enormous "Gamut of radiation," as it is termed, is tabulated in terms, borrowed from music, of "octaves," an octave representing a range in which the wave length is halved.

If we may borrow this convenient terminology, we may say that the range of wave lengths, from power transmission to gamma rays, represents more than sixty octaves. Of these, less than one embraces all that we ordinarily term light, from the longest red to the shortest violet. Furthermore, nearly all the energy of radiation we receive from the sun falls within three octaves, with its maximum lying within the visual or light range, but extending a short way into the ultra-violet and further into the infra-red.

During all his life on earth, up to less than half a century ago, man has lived content with this tiny band of solar radiation, ignorant of the vast ranges on either side. Like a race growing up on a small island in the middle of the ocean, content with the resources at hand and ignorant of all the rest of the World, its towering mountain ranges and broad plains, its vast forests and mighty rivers, its endless arctic snow fields, its steaming jungles and burning deserts, so, for the hundred thousand years or so man has been on earth, while he has grown and multiplied, developing from the savage state of cave dweller, distinguished from the other predatory beasts only by a large brain, to the estate of civilized man, organizing governments, building cities, establishing industry and commerce, creating literature and the arts he lived contentedly within the three octaves of solar radiation, up to less than half a century ago.

It is within the last fifty years that man has expanded his three octaves to more than sixty, as the direct result of scientific research. First came the long waves of alternating current power transmission, then the shorter Hertzian and radio waves, then on the other side of the solar band, came X-rays and the gamma rays of radium, and less than three years ago the last of the intervening gaps was filled.

This enormous expansion of the radiation range known to, and much of it used by, man has brought him many great benefits. Our present industrial efficiency would be sadly reduced were our electrical transmission systems obliterated, so thoroly has electric power supply become interwoven with our industrial fabric and so essential a part has it become. With the loss of radio, communications would suffer and the entertainment and instruction provided by broadcasting would be gone. Surgery and therapeutics would lose most valuable tools were they deprived of X-rays and radium.

But after all, apparently none of these radiations was utilized fifty years ago, and not only were there " cakes and ale" in those days but civilization had reached a high level and there probably was nearly as much happiness then as now, the of a simpler kind. Apparently, therefore, we could dispense with all radiations outside the three octaves which comprize the great part of solar energy, and still live and be happy. We say " apparently," for we cannot be sure that outlying radiations, the relatively feeble, are not in some way necessary to our vital processes. Indeed, five years ago it might have been assumed that we could dispense with the ultra-violet part of the solar energy, but recent research has shown how vital to plants, animals and man are the ultra-violet rays. Rickets, bone disease, and other ailments formerly attributed solely to undernourishment, may result from the absence of ultraviolet light. The medical profession is utilizing ultra-violet light, apparently with frequent success, to cure such diseases, to combat superficial lesions, and to build up increased resistance to deep-seated infections, tubercular and other. Plants, seemingly, require the ultra-violet stimulus in the production of chlorophyl. It therefore seems reasonably certain that, without the small division of the solar radiation which lies in the ultra-violet, life on this earth would not have evolved into its present forms.

Similarly we may, from the days of Pithecanthropus Erectus and before, have been utilizing unconsciously radiations far outside the three octaves that our main dependence. This seems particularly probable as regards the very shortest waves, the gamma rays from radium and other radioactive matter. The ionizing effects of these rays are everywhere on earth, feeble, but constant and all-prevading, and may have had a part in chemical reactions essential to the evolution of man. We know that, indirectly, they have been most necessary to evolution. Thirty or forty years ago there were apparently irreconcilable inconsistencies in the estimates of the age of this earth. Physicists, calculating from the measured rate of loss of heat from the earth's surface proved that the earth must have been in a molten state only one or two million years ago. Geologists, basing their figures on the rate of geological deposits, demanded twenty to thirty million years for the formation of the strats of the earth's crust. Biologist, knowing how slow are evolutionary processes, were content with nothing less than a hundred million years for the development of present species of flora and fauna. For a time the physicist seemed to have the best of it, for his figures were derived from direct measurement of present phenomena, not from estimates dealing with the distant past ; but then came the discovery of radium and other radioactive elements, and the whole foundation of the physicist's calculations cracked in bits and sank out of sight. A new source of energy had been found capable of multiplying many fold the effect of the latent heat of the earth's mass. As the physicist learned gradually how to incorporate this new factor in his calculations, he became willing to grant the geologist and biologist all they asked and much more. To-day, all branches of science are coming to an agreement that the formation of the earth's crust took place more than a billion, and probably more than a billion and a quarter, years ago.

So whether or not gamma rays are in any way essential to the maintenance of life and civilization at the moment, it is certain that, without the radio-active material of whcih they are a product, evolution would never have had time to reach the mammal stage.

The case of radio-active material is an exception to the old saying that all earth's energy comes from the sun. Ratio-active energy comes from that stored in the atom itself and is neither affected in any way by solar radiation nor by anything that man has yet been able to do. The last octaves of the " gamut of radiation" are like Kipling's famous feline " that walks by himself, and all places are alike to him." Man may take them as he finds them, and utilize them as he is learning to do, but they remain as yet uncontrollable, like the essentially undomesticated cat, " waving his wild tail and walking by his wild lone."

The rest of the sixty octaves man produces now at will, he must always begin with the three octaves of solar energy. From that energy, stored in coal fields or in hydraulic heads, he generates the long waves of electric energy for power transmission. From electric energy in turn he produces the other octaves, radio, and Hertzian, infra-red, visual, ultra-violet, and X-rays. Thus, in another sense, the incandescent lamp is a transformer—a transformer of time. As it receives its current from a steam-operated power station, it is releasing for this minute's use the solar energy of tens of millions of years ago, Doubly remarkable, then is this simple incandescent lamp, as a frequency converter with a ratio of more than a trillion to one and as a time transformer of perhaps a hundred million years.

It is only in the light range that man can usefully supplement outdoors the solar radiation in the three octaves where it reigns supreme. The New Yorker, standing in Times Square on a bitter January night, endures the same degree of cold that made the savage redskin shiver who perhaps stood on the same spot five hundred years ago that night. He has warmer clothes to protect him and incomparably better shelters to seek refuge in, but the rigor of winter cold is not softened one degree by all the marvels of civilization that surround him. When the sun goes down, the cold becomes more bitter, just as it did five hundred years before. But, whereas his dusky predecessor on Manhattan groped in darkness, our modern New Yorker is walking in a blaze of light. If we cannot repair the loss of heat at sunset, we can and so repair the loss of light. On all our streets in city, town and village, bright lights burst forth at nightfall to hurl back the gloom with their defiant beams. Motor head-lights sweep the dark from highway and from country road. Higher and higher standards of illumination on streets, on boulevards and parkways, and now on highways, are proclaiming that, in the field of light, and there alone, man is winning his independence of the sun. There is philosophic truth in the characterization of electric light as the " only rival" of old Sol.

Dodge Brothers May Sales Show New High Record

Retail deliveries of more new motor cars and trucks by Dodge Brothers Dealers in the United States and Canada during May than during April, this year, are significant of the healthy business condition of the automobile industry and of Dodge Brothers, Inc., in particluar. This showing is even more impressive when consideration is given to the fact that several weeks have elapsed since the usual peak of the retail selling season.

During the four weeks ended May 29 these retail deliveries by Dodge Brothers Dealers amounted to 37,660, a substantial increase over the previous four weeks and a gain of 12,735 or 51 per cent over the deliveries during the four weeks ended May 30,1925.

Dealers in the United States alone have delivered 144,199 new Dodge Brothers Motor Cars and Graham Brothers Trucks from January 2 to May 29, 1926, a gain of 48 per cent over the record of 97,572 for the corresponding period last year.

Retail sales since January 7, when Dodge Brothers made substantial improvements and reduced their prices have been so high as to prevent the building up of any substantial stocks of new cars. Since late in March retail deliveries week by week have exceeded factory shipments and the factory sales department has been receiving a constant stream of wires from Dodge Brothers Dealers asking for more cars.

A State Motor Launch

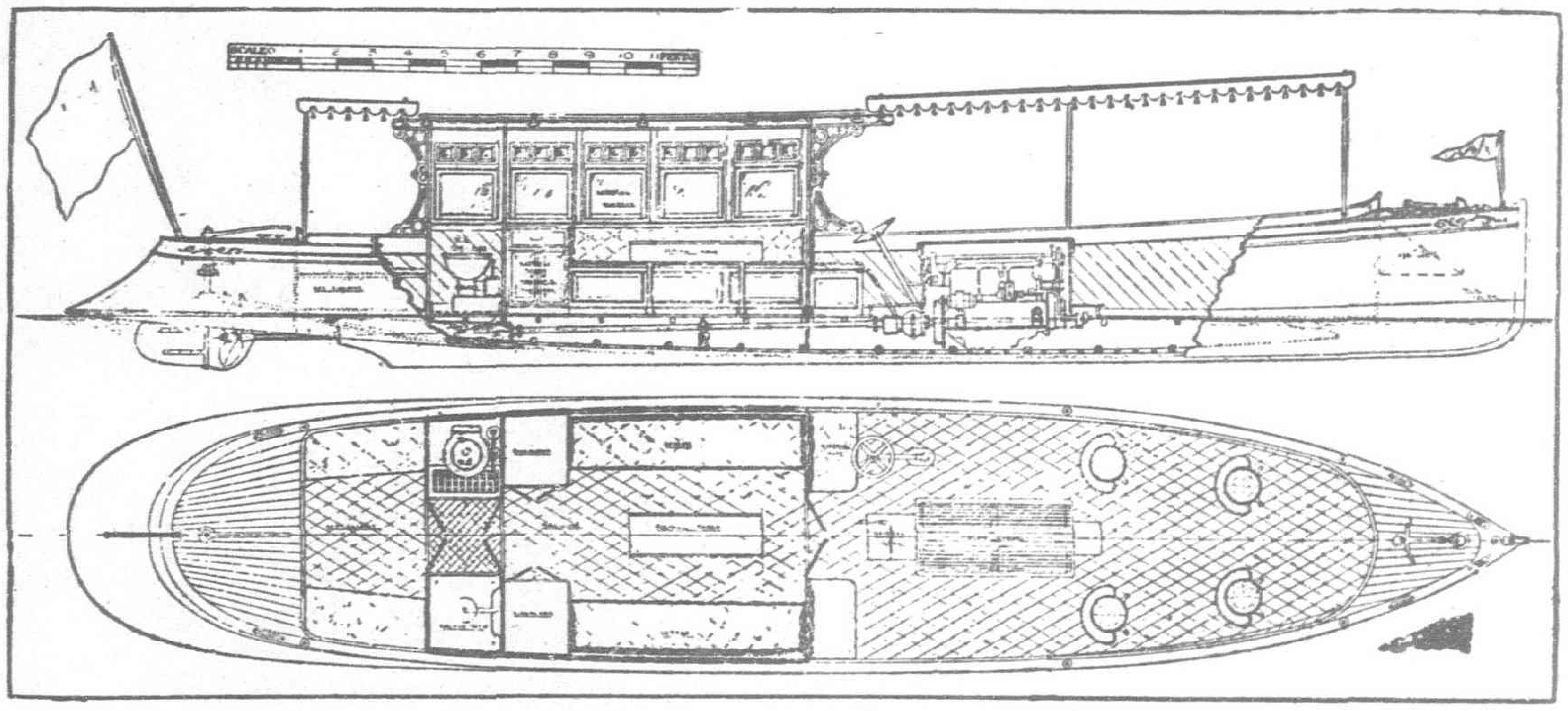
40-ft. 40 h.p. Launch for H.H. Sultan of Perak

FOR State service, to the order of the Sultan of Perak, a remarkable craft has recently been completed by Messrs. James Taylor & Bates, Ltd., of Chertsey-on-Thames. The boat in question, of which we publish the plans, is of very high finish and is 40-ft. overall, with a beam of 7-ft. 6-ins. and a depth of 3-ft. moulded. The draught is 1-ft. 6-ins. In order to reduce the last-named figure to a minimum, it has been necessary to accommodate the propeller partly in a tunnel, protection to the screw being afforded by a substantial skeg which forms the extension of the tailshaft outer bearing.

The whole of the forward part of the boat is devoted to a large cockpit, at the fore end of which upholstered chairs are arranged. Immediately aft of this seating accommodation is the engine, which is a six-cylinder 40-h.p. Wolseley marine motor, with reverse gear and electrical self-starter. A dynamo is driven by the engine, generating current for the starting motor and for lighting the interior of the boat. The helmsman is provided with a car-type steering wheel, the reverse-gear lever and engine controls being adjacent. On the starboard side, opposite the helmsman's seat, is a second seat.

Double swing doors give entrance to the saloon, which is embellished with very elaborately carved work. The ceiling is embossed, and all the curtains, carpets and awnings are of bright yellow brocade silk, yellow being the State colour. Settees are provided at each side of the saloon, sideboards being located at the after end. A second pair of double swing doors gives entrance to a compartment having on the starboard side a shower bath, with a lavatory opposite. A third pair of light swing doors gives entrance to a small after cockpit.

A speed of about 10 m.p.h. has been attained, and the craft has been shipped to her destination; her elaborate decorations made her an object of attraction at Chertsey. The drawings, however, do little to indicate the actual nature of the ornamentation. So far as the specification is concerned, the skin is of double-skin teak, having oiled canvas between the two skins, the inner one being worked diagonally and the outer planking longtitudinally. Further details regarding the minor points of the design may be ascertained from the drawings, and it will be observed that the propeller is accessible through a removable trapdoor which may be easily reached from the after cockpit.—(*The Motor Boat*).



Plans of a Luxurious Motor Launch Recently Constructed on the Thames

The Shanghai Municipal Electrical Supply

IN his report for the year 1925 to the Shanghai Municipal Council, Mr. T. H. U. Aldridge has, for the first time in the history of the Shanghai power stations to record a decrease in the current sold. The total was, nevertheless, 294,343,905 units, the decrease on the previous years' figures being 4.22 per cent. The fall was due to the great strike which broke out at Shanghai last year. The Chinese operatives employed at the station were out for three months during the summer, it is believed much against their will. This conclusion is supported by the absence of sabotage or of any organised attempt to interfere with the foreign staff who succeeded in maintaining supplies in spite of the very trying seasonal conditions. There was, moreover, no exhibition of rancour on the return of the workmen who appeared, in fact, to be glad to get back.

Mr. Aldridge gives in his report the table annexed, which shows the output at Shanghai as compared with leading British installations:

Year Ending	Undertaking.	Units sold for Year.	Maximum Demand in Kilowatts.	Load Factor Per Cent.
1925	Shanghai.. ..	294,343,905	72,930	53.06
,,	Manchester ..	257,352,920	120,390	31.99
,,	Birmingham ..	193,370,748	102,354	26.01
,,	Glasgow ..	179,263,199	85,700	29.31
,,	Liverpool ..	154,762,327	65,825	32.12
,,	Sheffield	154,464,320	72,356	29.29

The load factor is in all cases estimated on the basis of units generated and as will be seen is remarkably high. About 32½ million units were supplied for private lighting, and nearly 3.3 million for heating and cooking, whilst the demand for power, including tramway services, amounted to over 255½ million units. Charges for bulk supplies range as low as 0.6d. per unit. For lighting and fans the charge is about 3.66*d*. per unit, and for heating and cooking it is 1.08*d*. per unit. The highest charge for power is 1.62*d*. per unit. This is applicable when the consumption per horse power connected is less than 150 units per month. If the supply exceeds 350 units per month per horse power connected, the charge is 1.08*d*.

In spite of the strike, the thermal efficiency of the station was improved during the year. It averaged 17.43 per cent. and for one period reached 18.49 per cent. Still better figures are anticipated during the current year, as Howden-Ljungström air preheaters are being fitted to two large boilers. These it is expected will raise their efficiency from the present figure of 79 per cent. to about 85 per cent.

The maximum peak load taken during the year was 77,000 kw., and it is expected that this will rise to over, 90,000 before the new year. The plant now installed has a rated capacity of 121,000 kw. but it is proposed to increase this by 50,000 kw. The first instalment, for which contracts are about to be placed, will consist of a 20,000 kw. turbo-generator and 3 boilers. A second turbine and a fourth boiler will probably be ordered next year. The steam pressure for this new plant will be 350 lb. per square inch, and the temperature of supply is to be 700° F. A considerable quantity of underground cable is also to be ordered as well as additional switch gear.

Industrial Java

By "Djembatan".

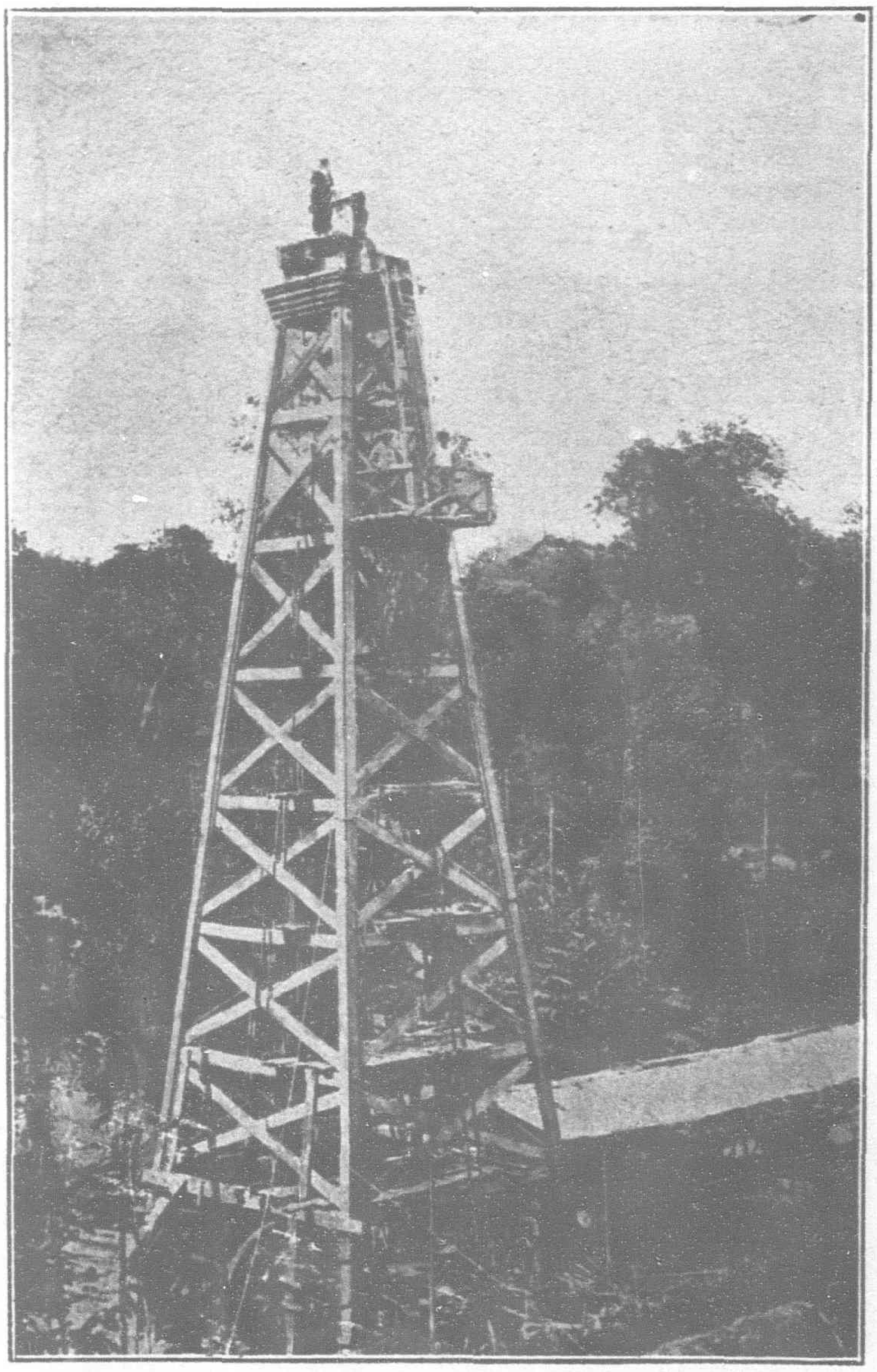
(The "Inter-Ocean" is publishing a series of articles on Industrial Java of which this is the second article. The series contains valuable data on the subjects discussed.)

DIENST van den Mijnbouw " (The Mine Service) is a body, independent of the Department of Government Industries and that in addition to the exploitation of the Government Mines it is also charged with the supervision of all private mining operations. Its jurisdiction extends to include the following activities, *i.e.* geological surveying, vulcanology, prospecting for minerals, carrying on researches of a mineralogical and metallurgical nature, locating and exercising legal supervision of private mining enterprises.

The Government mining industry is made up of the following mines : The Banka Tin Mines, The Ombilin Coal Mines, the Boekit Asem Coal Mines, the Pulu Laut Coal Mines and the gold and silver mines at Benkoelen.

If private firms wish to exploit minerals in the N.E.I. they must obtain a license to prospect and a concession, which are both subject to certain conditions regarding taxes, security and the like as laid down in the Mining Act of 1898. The latest revisions provide that no additional concessions will be granted to private individuals in respect of certain minerals, such as anthracite, petroleum, asphalt and other bituminous substances and inflammable gases. These minerals may only be exploited by the State itself or by private parties possessing an exploitation agreement with the Government. Concessions for other minerals are however still granted on the old lines but a permit must of course be obtained.

The most important of the mining industries are the Government tin mines at Banka. As early as 1718 tin was supplied to the East India Company by the Sultans of Palembang who were then rulers of that island so that it will be seen that it is an industry of long standing. The mining was first carried on by Malays but it was not long before the "merchants of the East," the Chinese took matters in hand. The Government placed it under European control in 1820 and since 1852 it has been under the supervision of mining engineers who are also in charge of the smelting operations. Many improvements have been introduced in the foundries, the drainage of the open cuts and the stripping of the overburden so that the tin industry of Banka is now entirely up to date and provided with the most modern machinery. Banka tin is known over the whole world for its purity, it being composed of 99 per cent. tin, whilst it is subjected to severe tests before being exported.



A Snapshot from Tarakan, the Dutch Borneo Oil Centre

Banka, the centre of this industry, is an island with a length of about 100 miles and most of the mines are situated on the north east side of the island. The ore which is found in the alluvial deposits of the river beds and on the slopes of the hills is worked in open cuts. Some of the deposits extend into the sea and for this work dredgers are used. The layers or strata in which the tin ore is found are mostly from 4 to 15 inches thick, but a few are being worked which are several feet in thickness. The overburden is removed by hand with the help of sluicing : this sluicing is supported by gravel pumps and nearly 70 per cent. of the ground is treated in this way. After having been washed, the ore is smelted in blast furnaces each district having its own furnace. Chinese labor is used and the average number of coolies engaged in this work is 20,000. Thanks to this enormous industry the N.E.I. occupies third place of importance in the list of tin producing areas, only being exceeded by the Straits and Bolivia. The average annual production for the last 25 years is 13,000 tons whilst in 1925 this has exceeded 18,000 tons.

Since 1914 Banka tin has been sold almost exclusively in Batavia by private treaty whilst a small quantity finds its way to Holland and the N.E.I. for use by the various branches of Government service in these two countries.

In addition to the Government mines there are two private enterprises which are also of importance, the chief which is the Billiton Mij which works the tin on the island of Billiton.

The Billiton Mij. received a concession in 1852 and eight years later work was commenced, which from the very commencement has been attended by success. In accordance with the new agreement 5/8ths. of the yearly profit goes to the Government : the agreement which ends in 1927 will probably be altered so that the mines will be worked for joint account of the government and the private company, which since its establishment has placed about 300,000 tons of tin on the market.

In addition we have the Singkep Tin Mij. which is also a private company as the name implies and which operates on an island of the same name in the Riouw Archipelago. It is here that tin ore is found on the bottom of the sea and for this purpose dredgers, mentioned above, are almost exclusively used. The ore obtained from these mines is sent to Singapore where it is smelted.

As regards the future of the tin industry it is pleasing to note that there is sufficient tin on the island of Banka to keep the mines going for the next twenty years and new deposits are frequently being found.

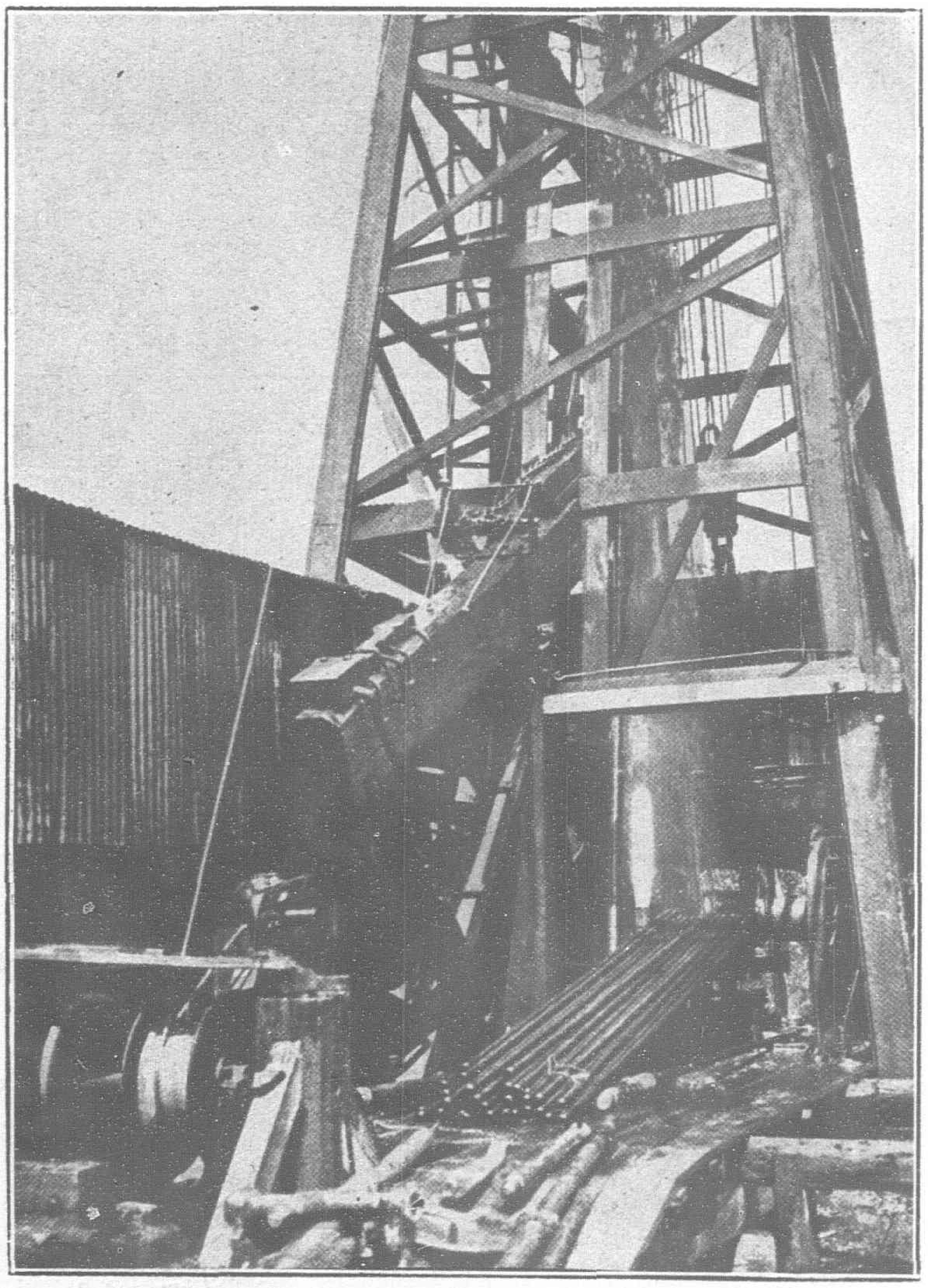
A capital of more than 14,000,000 guilders is invested in the Banka industry and the financial results are extremely good. Although the fluctuations in the world market price have of course reacted from time to time on the industry an average annual profit has been made during the last ten years of 290 per cent. which after all is quite a handsome figure !

The following table will give some idea of the production and profits of the Government Tin Industry at Banka for the last few years :

Year	Sold piculs	Value	Expenses	Net profit
1923 ..	322,371	*f* 48,234,346	*f* 20,882,306	*f* 27,352,039
1922 ..	328,308	,, 36,769.693	,, 25,153,065	,, 11,616,628
1921 ..	228,069	,, 25,715,003	,, 22,605,085	,, 3,109,917
1920 ..	153,841	,, 29,925,718	,, 12,811,045	,, 17,114,673

The provisional figures for 1924/5 show that the output amounted to 318,000 piculs.

As regards the coal mines the most important enterprises are in the hands of the Government: as already mentioned the Ombilin Mines, Pulu Laut, and Bukit Asem produce the bulk of the coal and this industry is rapidly developing. At present the whole of the output is required for bunkering and local use but it is possible that in the near future there will be a sufficient quantity for export. The Ombilin Mines are situated near Sawah Luntu in the Padang Highlands, a region which is also famous for its beautiful scenery. The coal fields here are very extensive and in some places seams 36-ft. deep are to be found whilst for the transport a railway has been built, 156 K.M. in length which transports the coal to the Emma Harbor at Padang. It is estimated that 200,000,000 tons of coal can be mined from these workings, which are built on the tunnel system. As only approximately 8,000,000 tons have been mined up to now it will be seen that there are ample reserves available.



Close View of Oil Well and Derrick. The Oil is Forced out under High Pressure

These mines were actually brought into operation at the instigation of the Naval Department, which realised that in time of war the warships of the N. E. I. navy being dependent on imported coal, would be placed at a great disadvantage and could even be cut off from all supplies and therefore be helpless as a defence unit.

The coal produced is of excellent quality and tests have shown that it can be put to various uses. The labor employed is Japanese and Chinese, the latter being to a large extent prisoners who have been sentenced to penal servitude. Up to a short time ago considerable trouble was experienced with regard to the escape of these prisoners but now measures have been taken, whereby the road from the prisoners' quarters to the mine has been completely enclosed so that escapes are now less frequent.

A mine has been worked on the island of Pulu Laut, off the coast of Borneo since 1913, and the whole of the island is reserved by the Government for mining and geological research purposes. Stagen, the centre of the industry, is connected with the harbor by a railway and it is from this harbor that large quantities are exported, the situation being extremely favorable, lying as it does in the direct route of shipping between South Africa, Australia, Java and Macassar and China and Japan. About two thirds of the output is delivered to the various Government services and the other third is sold to private concerns.

A third important Government coal mine is situated in the Residency of Palembang and is known as Bukit Asem. It was known that deposits of coal were present in this district but little attention was paid to the fact owing to it being brown coal. Later on however it was discovered that in some places the quality was extremely good and as there was a coal shortage in the N.E.I. it was decided to exploit same. The better class coal is found in three seams : the upper layer, 6 to 7 yards thick, the middle layer consisting of strata 8 and 3 yards thick and the lower strata with a thickness of from 6 to 8 yards. The coal is very pure, giving not more than 3 per cent. ash and usually from 1=2 per cent. These mines which were at first in private hands were taken over by the Government in 1919 and at the present time three kinds of coal are marketed, *i.e.* Lematang marine coal, Bukit Asem coal and briquette coal.

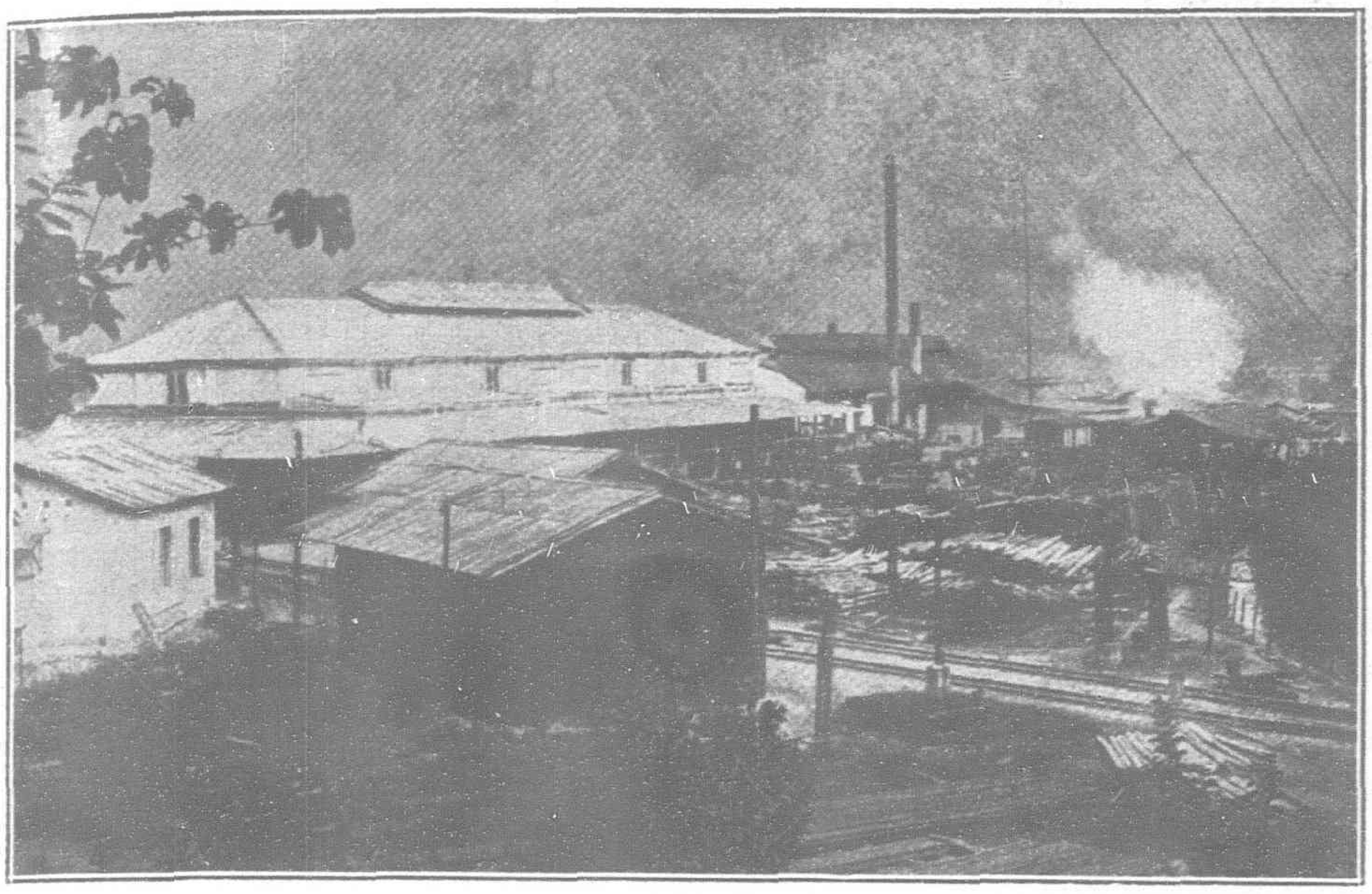
During the last few years many improvements have been made whereby the mines have been brought up to date. The capital invested in the Government coal mines amounts to something like Glds. 18,160,000, a not so very large sum when one considers the extensivesness of the industry. During the last decade the average profit earned by the coal mines after provision having been made for depreciation and all expenses was 20 per cent. per annum.

Coal mines in private hands do not meet with the success which has attended the Government enterprises and their output is less than 500,000 tons annually. The private mines are situated for the greater part in Borneo among which the following are worthy of mention. Near Samarinda on the Mahakam river we have the mine Batoe Penggal belonging to the Oost Borneo Mij., the two mines of Parapattan Mij. which is administered by the K.P.M. (Royal Packet Navigation Co.) known as Parapattan and Rantau Pandjang and the Goenoeng Batoe Besar mine situated on the Bay of Pemoekan and which is exploited by the Malayan Collieries of Singapore.

In addition to the above companies and a few smaller enterprises coal is also mined to a small extent by the native population but this is so insignificant that we can pass over same.

The following table shows the output of the Government and private mines during the last four years :

		Ombilin Mine tons	Pulu Laut tons	Bukit Asem tons	Total Government Mines tons
1924	..	630,028	147,138	235,204	1,012,370
1923	..	508,374	143,980	176,186	828,540
1922	..	544,002	113,218	113,481	770,701
1921	..	602,853	208,900	172,939	984,602



Store Houses and Timber Yard at Sawah Lunto Coal Mines

		Batoes Penggal	Parapattan	Rantau Pandjang	Batoe Besar
1924	..	171,775	100,067	—	63,084
1925	..	103,259	20,808	65,833	50,309
1922	..	82,121	61,227	17,300	28,252
1921	..	62,394	43,456	7,412	15,595

The total amount of coal mined by private enterprise during these years including that mined by the natives and the smaller concerns was thus :—

1924	1923	1922	1921
457,992 tons	328,085 tons	269,977 tons	227,437 tons

From these figures it will be seen that the output of the private mines has in the last four years doubled itself, an increase which is due to a large extent to the introduction of modern machinery and working systems. We now come to a branch of the mine industry which is of a more interesting nature *i.e.* the gold and silver mines.

The most important district of Netherlands India for this group of mining is the Lebong district in the residency of Benkoelen in Sumatra. Everything points here to an important gold mining industry having existed, probably long before the advents of Western civilisation, an industry which was not confined to gold washing but which also included mining operations in its activities. Remains of this industry have been found at Lebong Simpang, Soelit and Tambang Sawah and there is every reason to believe that a prosperous native industry onced existed here.

Under European Government this district first became important as a gold mining centre in 1899 when the well known Redjang Lebong Mining Co. obtained a concession for working the deposits at Lebong Donok and A. Baliman. The work was commenced with a battery of six stampers which was gradually extended until in 1908 this had grown to a battery of 70 stampers. In addition to the stampers cylinder mills had by this time also been introduced and that the enterprise was a success will be realised when it is mentioned that during the period 1903-1917 an average annual dividend of 43.6% was paid to shareholders.

In 1906 the Simau Mining Co. obtained a concession for working the deposits Simau and Tandai and in 1910 this company was working at full capacity whilst substantial profits have been made since then.

In the meantime in 1905 the Government ordered an investigation into the presence of useful minerals in the residencies of Palembang and Bencoolen which led to valuable deposits of silver and gold being found at Lebong Simpang and Tambang Sawah which have since been exploited by the State. There are still two other mines in Sumatra known as Salida and Marganai mines which after having been exploited first by the Malays and later by the East India Co. were taken over by an English syndicate at the beginning of this century only to pass later into the hands of the Kinandam Sumatra Mining Co.

In addition there are several small mines in North Celebes which are of less importance.

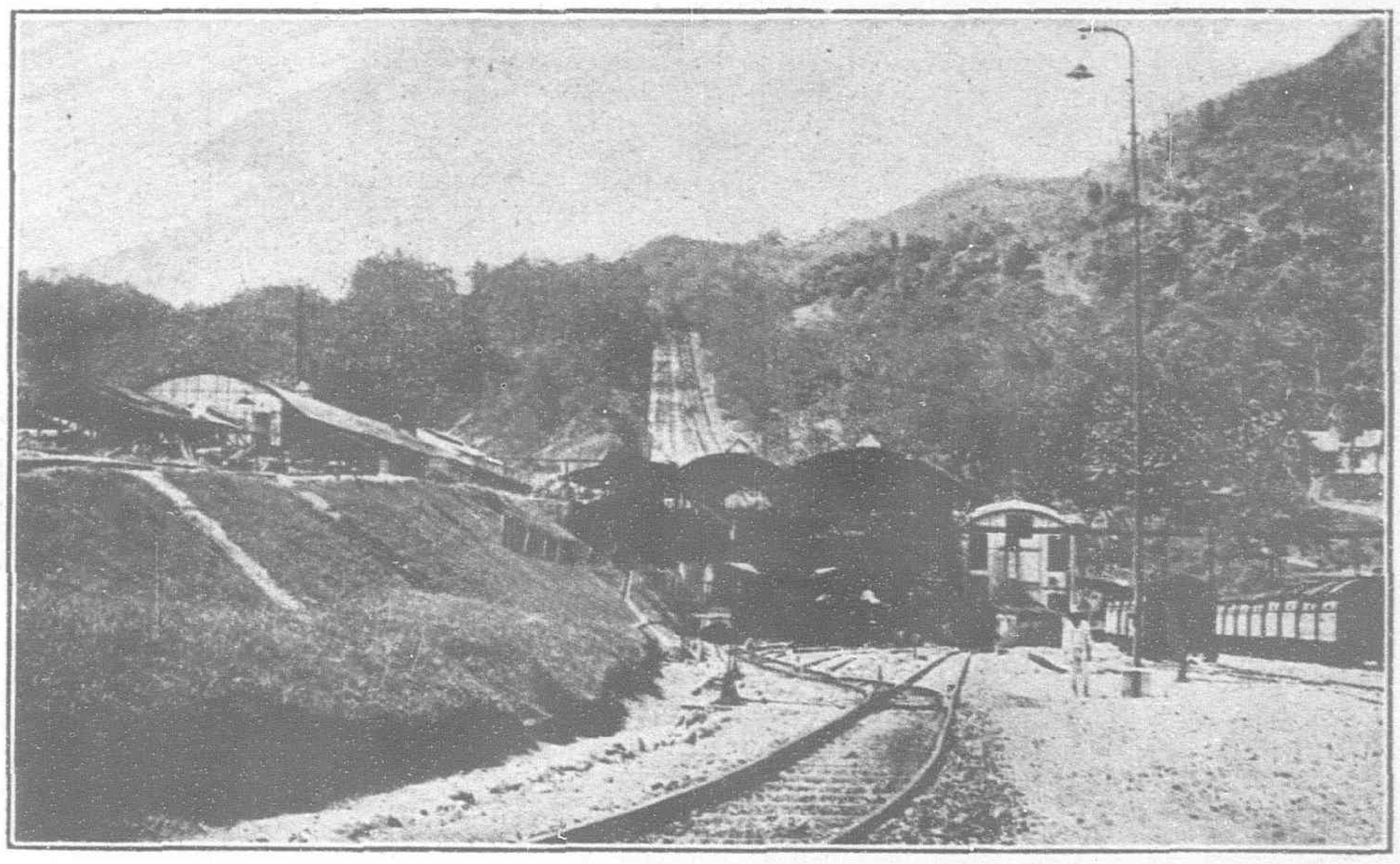
A considerable amount of prospecting has also been carried out in Java especially in connection with silver deposits which are supposed to exist in the neighborhood of Soekaboemi and on the coast of Bantam. It is undoubtedly a fact that silver does exist here but it is either in such small quantities or so difficult to transport that the exploitation would be unprofitable.

In addition it must not be forgotten that there are thousands of square miles of land in Borneo, Celebes and New Guinea which have never been prospected and where undoubtedly rich deposits of metals and precious stones are awaiting discovery. In these districts however prospecting is a difficult, dangerous and expensive pastime and it is probably for this reason that Dutch enterprise has not taken the initiative, Holland itself being too small to exploit these extensive regions. That these large islands will in later years be the centre of gold, silver, diamond, coal and other mining industries is without doubt and it will probably not be long before foreign interests realize the importance of this territory and turn the present impenetrable jungle into a busy hive of industry.

The following table shows the output of the principal mines in 1924 together with the value of the production :

	Gold	Value	Silver	Value
Government ...	319.8 K.G.	*f* 574,420	19,299 K.G.	*f*1,051,837
Redjang Lebong ...	1050.8 K.G.	1,887,269	6,274.3	341,948
Simau	1367.1 K.G.	2,455,238	18,217.7	992,865
Aequator	364	653,776	11,514.3	627,529
Kinandam	124.1	222,920	8,894.3	484,737
Paleleh	232.9	418,202	218.5	11,906
Bolang Mongondou	410.6	737,398	379.8	20,698

The visitor to Java or for that part any island of the Netherlands Indian Archipelago will not have failed to see the initials B. P. M. and many have probably wondered what their meaning was. These letters may almost be regarded as being the trade mark of one of the most important industries of Netherlands India *i.e.* the petroleum industry.



Sawah Lunto: Lifting House and Cable Way in the Background

The birth of this important asset was in 1888 when the Dordtsche Petroleum Mij. was founded with a capital of Glds. 150,000 for the exploitation of oil fields which had been discovered in the neighborhood of Sourabaya and a refinery was erected at Wonokromo to deal with the crude oil coming from these oilfields. The next step came in 1890 when the Koninklijke Nederlandsche Maatschappij tot Exploitatie van Petroleumbronnen in Nederlandsch Indie (Royal Dutch Company for the Exploitation of Oil Wells in Netherlands India) was floated with a capital of Glds. 1,300,000 a tremendous capital for those times. Gld. 200,000 of this capital in shares was allotted to Mr. de Ruyter Zijlker for the concession which he brought with him and which had been granted to this gentleman by the Sultan of Langkat in 1885. This transaction was made possible by the Government which had previously carried out a geological survey of the ground on behalf of the concessionary, Mr. Zijlker and had also made borings and drawn up a scheme for the exploitation of the oil. A pipe was laid down from the oil field to Pangkalan Brandan (Sumatra) where a refinery was established. Then came in 1897 the Sumatra Palembang Petroleum Mij. and the Petroleum Mij. Moeara Enim which had carried out prospecting in South Sumatra and which had discovered promising oil fields. The former erected a refinery at Bajoeng Lentjir and the latter one at Pladjoe, near Palembang. The Shell Transport and Trading Co. then too began to take an interest in Netherlands India as an oil producing country and acquired a concession from a Government's Mine engineer, Menten in respect of territory on the East Coast of Borneo known as Koetei. For the exploitation of this oil field the Shell formed a company in 1898 which was known as the Ned. Indische Industrie & Handel Mij. and which erected a refinery at Balikpapan. These were the most important oil companies which had been established up to 1898 : there were of course also a number of smaller concerns which had obtained concessions or rights but the majority of these made no use of same or only carried out operations on a small scale. During the next few years a number of companies saw the light one of which was the Perlak Petroleum Mij. which however soon transferred its rights to the Royal Dutch in return for a royalty.

America now came in the field in the form of the Standard Oil Co. of New York which formed the Nederlandsche Koloniale Petroleum Mij. and which carried out extensive exploration operations over the whole of the Archipelago, without however achieving great success.

The youngest and probably one of the most promising concerns to enter the oilfield is the Nederlandsch Indisch Ardolie Mij. which was established in 1911 by the Government and the Bataafsche Petroleum Mij. (B.P.M.) for the exploitation of the oilfield in Djambi.

All these companies exploited their wells, refined their oil and sold their product in their own way so that competition soon became rife and the price of petroleum in East Asia fell by leaps and bounds. The oil was at that time only worked into kerosene, residue, asphalt and tar : that valuable product, which during the last decade or two has improved the position of the petroleum companies to such a large extent, petrol, was then of little use in the colony and it appears that it was impossible to export it abroad. We can therefore hardly restrain a smile when we read in one of the annual reports of the Moeara Enim Company that " considerable difficulties were experienced owing to the large quantity of benzine which the oil contained " !

It soon became obvious that closer co-operation was necessary if the Dutch petroleum interests were to remain at the front and consequently after many discussions the following companies decided to combine : The Royal Dutch (which had already combined with the Sumatra Palembang) the Moeara Enim Company, the Ned. Ind. Industrie & Handel Mij. with the Shell and the Dordtsche Petroleum Mij. This transaction was carried out in conjunction with the Russian groups belonging to the Rothschilds as far as the sale of kerosene in the Far East was concerned.

In order to be able to compete even more strongly with the Standard Oil and independent sales company was established by the Royal Dutch, the Shell and the Rothschild group which was founded in 1903 in London and was to be known thereafter as the Asiatic Petroleum Co.

At the end of 1907 the petroleum industry was, with the exception of a few small concerns not worth mentioning, in the hands of the Royal Dutch, the Shell and the B. P. M., the latter working exclusively in Java. It was in this year that the important agreement between the Royal Dutch and the Shell was signed and the "Royal-Shell-Group" came into being. The result of this amalgamation was that both concerns transferred their properties to two new companies, a Dutch company which was chiefly engaged in the

PRODUCTION OF CRUDE PETROLEUM IN 1,000 K.G.

Companies	Year	Eur. personnel	Labourers	Semarang	Rembang	Soerabaja	Madoera	Palembang	Djambi	East Coast of Sumatra	Atjeh and Ond.	S. and E. districts of Borneo.	Amboina (Seran)	Total.
On the territory of the K. N. M. E. P. in N. E. I. and sister companies ...	1924	456	12,609	15	233,008	60,782	—	389,027	—	82,528	86,924	1,997,153	47,722	2,897,159
	1923	462	12,199	1,703	234,853	58,399	—	363,929	—	129,732	104,232	1,879,545	46,900	2,819,293
	1922	503	14,586	—	190,751	60,220	—	350,682	—	88,044	119,697	1,521,081	45,196	2,375,671
	1921	571	16,263	5,014	209,503	62,062	—	345,637	—	59,750	186,510	1,436,729	49,262	2,354,467
Ned. Koloniale Petr. Mij.	1924	33	468	—	8,845	—	—	13,699	—	—	—	—	—	22,544
	1923	16	206	—	7,282	—	—	5,952	—	—	—	—	—	13,234
	1922	8	155	—	3,779	—	—	2,532	—	—	—	—	—	6,311
	1921	9	278	—	2,818	—	—	1,530	—	—	—	50	—	4,398
Algemeene Petr. Mij.	1924	2	17	231	—	—	—	—	—	—	—	—	—	231
	1923	2	17	290	—	—	—	—	—	—	—	—	—	290
	1922	2	15	319	—	—	—	—	—	—	—	—	—	319
	1921	3	13	252	—	—	—	—	—	—	—	—	—	252
Oriental Petr. Compagnie	1924	3	26	—	—	50	—	—	—	—	—	—	—	50
	1923	2	30	—	—	45	—	—	—	—	—	—	—	45
	1922	3	32	—	—	92	—	—	—	—	—	—	—	92
	1921	5	34	—	—	174	—	—	—	—	—	—	—	174
Madoera Petr. Mij.	1924	1	3	—	—	—	11	—	—	—	—	—	—	11
	1923	1	50	—	—	—	12	—	—	—	—	—	—	12
	1922	1	266	—	—	—	5	—	—	—	—	—	—	5
	1921	1	176	—	—	—	3	—	—	—	—	—	—	3
Ned. Ind. Aardolie Mij.	1924	9	189	—	—	—	—	—	5,773	—	—	—	—	5,773
	1923	4	108	—	—	—	—	—	174	—	—	—	—	174
Total	1924	504	13,302	246	241,853	60,832	11	402,726	5,773	82,528	86,924	1,997,153	47,722	2,925,768
	1923	487	12,610	1,993	242,135	58,444	12	369,881	174	129,732	104,232	1,879,545	46,900	2,833,048
	1922	517	15,054	319	194,530	60,312	5	353,214	—	88,044	119,697	1,521,081	45,196	2,382,398
	1921	589	16,764	5,266	212,321	62,230	3	347,167	—	59,750	186,510	1,436,779	49,262	2,359,294
	1920	14,797		352,474				536,482				1,455,227	21,136	2,365,320
	1919	12,350		258,655				521,756				1,372,140	7,311	2,159,862
	1918	12,089		241,212				519,989				999,426	3,574	1,764,200
	1917	10,525		232,813				666,278				869,262	2,256	1,790,699
	1916	10,837		243,442				526,080				957,395	3,264	1,730,181
	1915	9,410		256,838				491,611				893,890	1,101	1,643,440

exploitation and winning of the oil and which was to be known as the Bataafsche Petroleum Mij. (B.P.M.) and an English Company which was to buy, transport, warehouse, sell and distribute the product of the company: this company received the name of the Anglo-Saxon Petroleum Co. The Royal Dutch took 60 per cent. of the shares of the new companies and the Shell 40 per cent.

The only remaining concern of any importance was then the Dordsche Petroleum Mij. the share capital of which had been transferred in 1907 to the Dordsche Petroleum Industrie Mij. In 1911 the B. P. M. bought the whole of the share capital of the D.P.I.M. and thus the last competitor, with the exception of the Standard Oil, disappeared. In 1922 the B. P. M. took over all rights and properties of the D.P.I.M. so that the latter concern ceased to exist.

The three great concerns which operate in Netherlands India are therefore the B.P.M., the Ned. Koloniale Petroleum Mij. and the composite industry of the Ned. Ind. Aardolie Mij.

As regards the oilfields themselves these are situated in Sumatra: Pangkalan Brandan and Pladjoe, two in Java: Tjepoe and Wonokromo and one in Borneo: Balikpapan. In addition to these there are three smaller refineries in operation *i.e.* one on the island of Ceram belonging to the Boela Petroleum Mij. one at Kendal of the Algemeene Petroleum Mij. and one at Petak of the Ned. Koloniale Petroleum Mij. The crude oil obtained on the island of Tarakan is not refined but is sold as fuel oil.

Both the simple and the fractional methods of distillation are used in these refineries. The refinery at Balikpapan is the most modern of all being equipped with the most up to date machinery and it is regarded as one of the largest and best petroleum factories in the world. The principal products which are now obtained from crude oil are benzine, petroleum, residue. solar and Diesel oil, lubricating oil, paraffin, candles, batik wax, vaseline, asphalt and cokes. Attached to the refineries there are a number of smaller industries for the manufacture of tins, cases, iron drums and wooden cases whilst at Balikpapan there is a sulphuric acid factory.

The product obtained from the refineries at Tjepoe and Wonokromo is for the greater part sold in Java itself whilst that obtained from Sumatra and Borneo is destined for export. The principal markets are the Eastern countries such as China, Japan Siam and the Straits whilst during the last few years a considerable quantity of benzine has been exported to Australia, East Africa, Egypt, Europe and even America.

Before closing this article on the mine industry in Netherlands India it is necessary to mention a few other minerals which are also found in considerable quantities. The most important are diamonds, jodium, wolframite, manganese and sulphur. The winning of diamonds is confined to Borneo but the exploitation is limited to ground where washing can be carried out in the simplest possible manner. The richest spots have already been thoroughly searched by natives and Chinese so that only the more difficult plots are left for the Europeans. A start was made some years ago by an European concern but owing to lack of capital it was forced to discontinue its activities.

Jodium is obtained from water possessing this quality which is found in several parts of East Java. Manganese is mined in mid-Java by an European concern with fluctuating success whilst wolframite is exploited by the Billiton Mij. in conjunction with the tin mining there.

Sulphur exploitation has so far only been carried out on a small scale in the various craters but a scheme is in process of formation for the winning of sulphur on a large scale from the Goenoeng Patoeha.

This short survey gives some idea of the immense and valuable assets of the Netherlands Indies in the form of minerals, not to speak of the as yet undiscovered riches of the Outer Possessions which will no doubt in the years to come raise the country to the position of one of the most important mineral producing countries of the world.

Copper Mines in Ningyuan, Szechwan

THE Tsingtungshan copper mines in Ningyuan prefecture, Skuikwan, Szechwan province, were started during the Wan Li reign (1573-1619) of the Ming dynasty, and were prosperous until some time in the Chia Ching reign (1796-1819) of the Ching dynasty. They were then abandoned owing to an excessive supply of copper on the market. Tsingtungshan is located 90 *li* north-east of Yenyuan. The area of the abandoned mines is now called Laoshan, to distinguish it from Sinshan, the area of the new mines. These new mines were opened in 1892 by Lo Yu-san, a local worker of gold placers, who also sunk new shafts at Laoshan. Continual shaft sinking, both at Sinshan and Laoshan, has brought the output of copper up to about half a million piculs. Some of the veins were found to be over 100 *chih* in thickness. But in 1921 a number of miners had to suspend operations for lack of capital; but through friendly help from Mr. Lo they were later able to carry on their workings. With the exception of Mr. Lo, however, the rest could operate only on a very limited scale.

In Shuikwan there is a population of 200, apart from many aborigines known as Pakiatusze, who are the original owners of the land. Railway facilities for the transportation of the ore from Tsingtungshan to the Chinkiang are lacking, and Chihhwangposhan, near the west bank of the river, is mountainous and its crossing necessitates an elevated railway.

The ore is copper glance (Cu_2S), associated with other copper ores, including native copper, cuprite, azurite, and malachite. The deposit occurs as veins in fissures and cavities of sandstone. The outcrops dip at varying angles, from nearly horizontal to 60 degrees, and the strike SE-NW, or NE-SW, with irregular changes. Small faults are frequently observed. Veins of associated ores are common. Abandoned shafts have been found in the vicinity. Copper mines are also operated at Chungchang, Tapa, Mawangpao and Tungchangping, the first two localities being 40 *li*, the third 20 *li*, and the last 60 *li* from Tsingtungshan. The deposit in Mawangpao occurs in pockets; and the deposit in Tungchangping is similar to the Tsingtungshan deposit with small veins.

There are two smelting plants, one owned by Lo yu-san, and the other by an association. The latter plant is rented to the miners. Each plant is equipped with two furnaces. Lo's plant is also equipped with two water wheels, one for breaking charcoal, and the other for moving the bellows. The empty furnaces are heated with firewood the night before, and loaded with charcoal next morning to half a *chih* above their openings. Hydrostatic bellows are placed about the upper part of these openings and operated as soon as the charcoal is kindled. When the flame reaches the top of the furnace two small panfuls of ore, each weighing 20 catties, are added; and when the ore and charcoal sink to eight or nine *tsun* below, two big panfuls of charcoal, each weighing 20 catties, two small panfuls of the ore, and two small panfuls and a half of limestone are again added. The process is repeated on the sinking of the heated ore and burning charcoal to a similar length below. The heating lasts 24 hours for large furnaces and 12 hours for other furnaces. The slag is removed and used in refining. The smelting of 4,000 catties of the ore in a big furnace yields about 800 catties of crude copper, consuming 2,000 catties of charcoal and 600-700 catties of limestone. The mineral contains about 80 per cent. of copper. The limestone used as a fusing reagent occurs in Taishihkow, opposite to Tsingtungshan. It is washed down the valleys by flowing water in the summer; thus the cost of transportation is lessened. The metal is collected by the Government Copper Mint at $20 per 100 catties. The tax on the metal is 7.5 per cent. *ad valorem.*

Far Eastern Cable Contracts

Sir Thomas O. Callender, at the 30th annual meeting of Callender's Cable and Construction Co., Ltd., recently held in London, said that the firm had recently secured an important contract in India for the electrification of the suburban lines of the Bombay, Baroda, and Central India Railway, extending to about 24 miles. Great importance is attached to this contract, and it is hoped that it will lead to other similar ones. Work has been carried out, and is being undertaken, in the Malay Peninsula, Aden and Khartoum, and also in Persia and Shanghai. A large contract has also been secured for the Municipality of Sydney, Australia, to whom the firm has supplied similar cable at various times since 1916.

Five Year Programme for Locomotives for Indian Railways

AN interesting official communication from Calcutta states that the number of new locomotives required for the railways in India, according to the quinquennial programmes of the various railways operating under the Railway Board, will be as follows :—

In 1926-27	ninety broad guage
In 1927-28	seventy nine
In 1928-29	sixty two
In 1929-30	ninety one
In 1930-31	one hundred and twenty nine

The following are the corresponding figures for metre guage engines—63, 81, 51, 61, 28. Provisional conclusions have been reached regarding standardization, and as a result 89 engines of various different types have been ordered with the idea of testing their suitability.

At present no locomotives at all are manufactured in India, the only private company ever started for this kind of work having turned their attention to the manufacture of wagons.

With regard to wagon construction it is interesting to note that orders for 3,200 have been placed with Indian firms, and these orders represent their maximum capacity, and the bounty payable by the Government of India averages Rs. 228 per wagon.

The report states that pending further enquiry into the position of the steel and associated industries due in the current year, legislation has been adopted extending the wagon bounty for another year.

It is pointed out in the last report of the Tariff Board that " Under the system recommended by the Board, and accepted by the Government of India, the Indian wagon-building firms themselves decide what the bounty is to be, for the bounties sanctioned are ordinarily equal to the difference between the lowest Indian and the lowest British tender for each type of wagon. In a scheme of this kind it becomes unnecessary to determine costs, for the wagon-building firms are themselves in the best position to decide what is the lowest price which makes an order worth acceptance."

It should be added that the Commerce Member, when securing the support of the Legislative Assembly to the renewal of the bounty, observed that the sole object of the Government of India in paying these bounties is to enable the industry to establish itself, in order that, as soon as may be, protection may be dispensed with. Tenders are called from all over the world ; The Indian manufacturer has to contend against the lowest satisfactory tender from the entire world, and the bounty is the measure of difference between the two.

Contract for Vessel for Straits Trade

Hall, Russell & Co., Aberdeen, Scotland, have received an order for a cargo and passenger steamship from Alfred Holt & Co., Ltd., Liverpool—acting on behalf of the Straits Steamship Co., Singapore. The vessel will be specially designed for the Straits Settlements trade.

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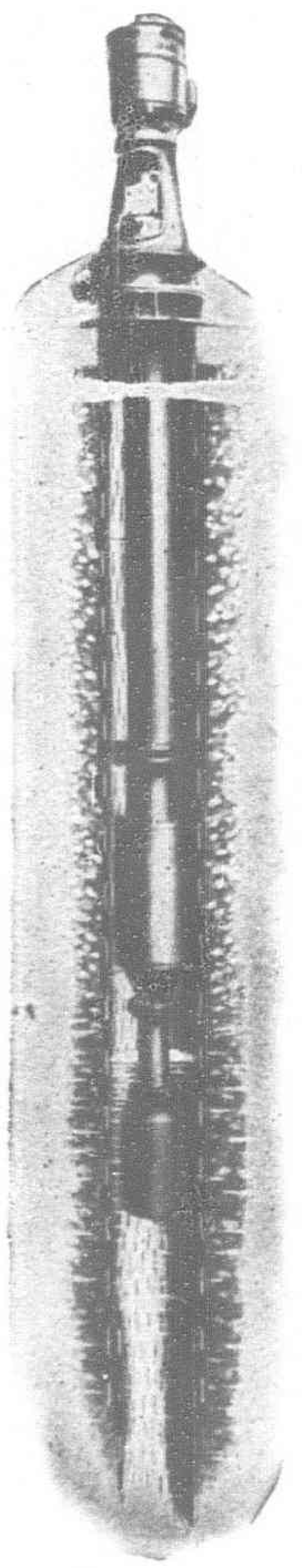

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